The IRON AGE

March 3, 1960 A Chilton Publication The National Metalworking Weekly

Special Report to Management—

More For Your Cutting Fluids Dollar P. 87

Can Business Avoid A Severe Slump? – P. 53

Changing Trends In Materials Management – P. 64

Digest of the Week – P. 2-3

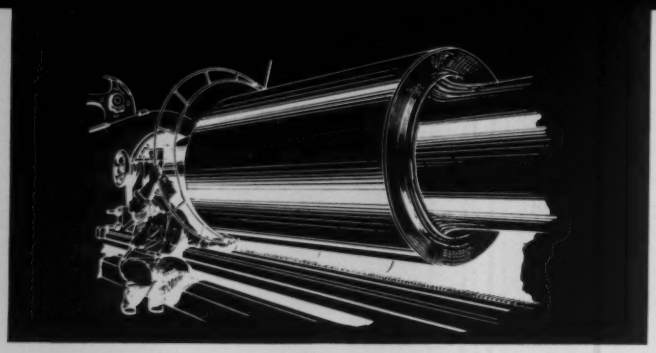
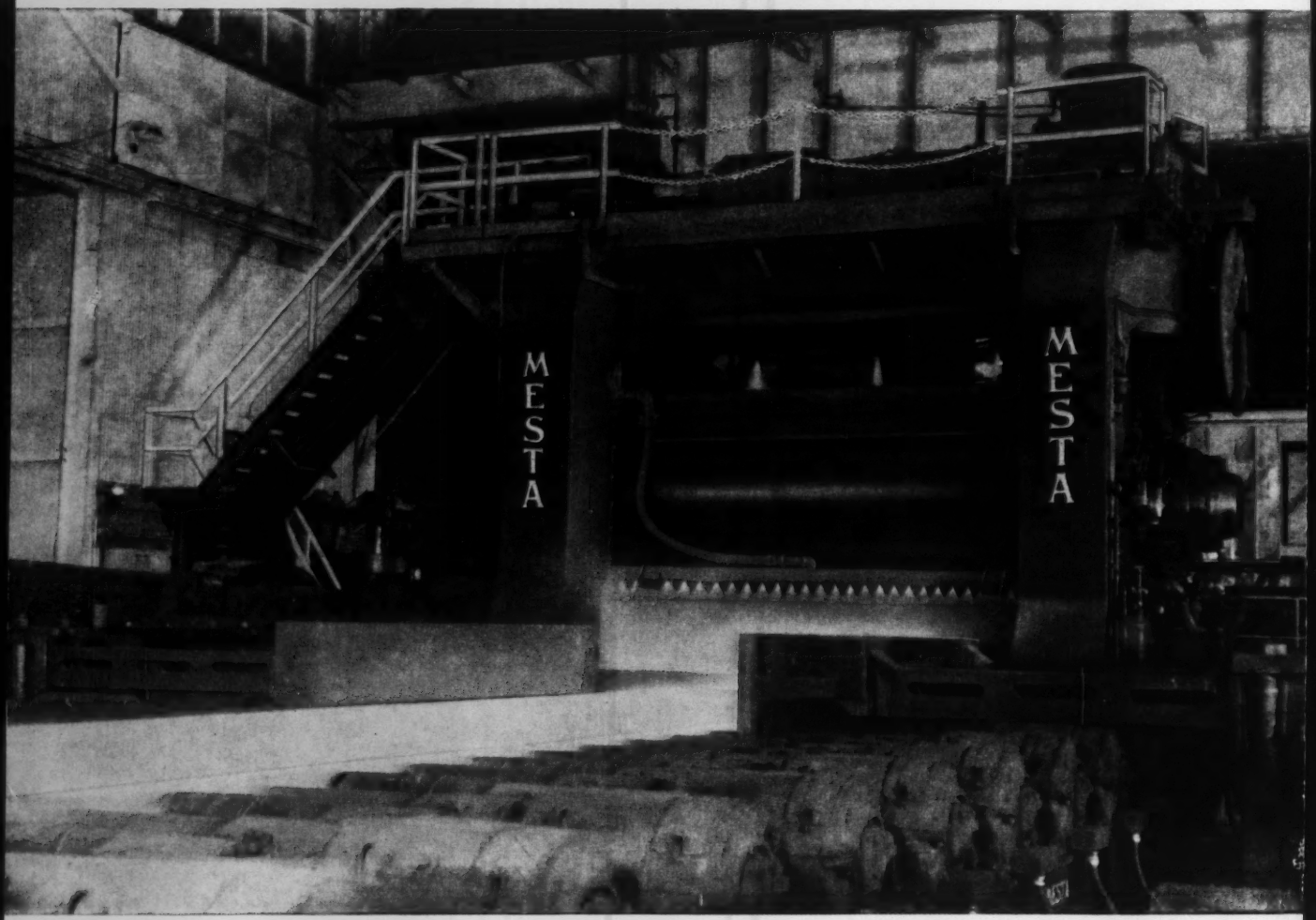


PLATE MILLS *designed and built by*

MESTA



160" Four-High Reversing Plate Mill

MESTA *Machine Company*

Pittsburgh, Penna.

Flange diameter: 106 inches

No less impressive: body diameter is 96 inches, and bore diameter is 75 inches. This main cylinder stands 115¾ inches high, and weighs 103,300 pounds. Made of molybdenum-vanadium steel, we heat-treated and tested it before shipping to our customer. By now, it's been finish-machined and is hard at work in a hydraulic press.

Incidentally, the same order called for three other cylinders, one bolster, and four tie rods. These pieces ranged in weight from 22,000 pounds to 113,000 pounds. Bethlehem forged and machined them all as specified, and delivered them on time.

RIGHT ON THE NOSE. Our shops will meet your specifications *exactly* on all types of press, drop, and hammer forgings, regardless of size or design.

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BPA NBP

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The IRON AGE

March 3, 1960—Vol. 185, No. 9

Digest of the Week in

*Starred items are digested at right.

EDITORIAL

The Fabulous Competition: Better Get Ready for It Now ... 7

NEWS OF THE INDUSTRY

*Is a "Normal Year" Good Enough? ... 53
*Management Girds for a Fight ... 55
*Research and Sales Go Together ... 56
*Can Government Help Tool Builders? ... 57
*Imports Stall Ore Price Rise ... 58
The IRON AGE Salutes ... 61
*Materials Management Concept Stirs PA Debate ... 64

ENGINEERING-PRODUCTION

An IRON AGE Special Report To Management
How to Get More for Your Cutting Fluids Dollar
*What Does a Cutting Fluid Do? ... 87
*Match Cutting Fluid to the Job ... 90
*How Metals Influence Selection ... 93
*Tooling: Speeds and Pressures ... 96
*Care of Cutting Fluid Pays Off ... 100

NEWS ANALYSIS

Newsfront ... 9
Report to Management ... 63
Automotive ... 69
Washington ... 73
*West Coast ... 75
*Machine Tools ... 77

MARKET AND PRICE TRENDS

Market Planning Digest ... 51
*The IRON AGE Summary ... 147
Purchasing ... 148
Iron and Steel Scrap Markets ... 152
Nonferrous Markets ... 156

REGULAR DEPARTMENTS

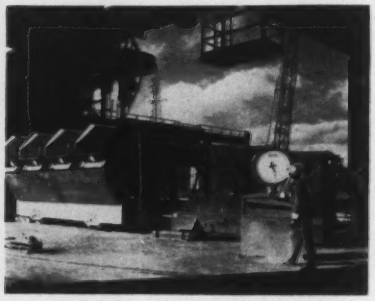
Letters From Readers ... 11
Industrial Briefs ... 78
Men in Metalworking ... 81
Free Literature ... 104
Design Digest ... 110
New Books ... 114
New Equipment ... 120

INDEX TO ADVERTISERS ... 172

News of the Industry

BUSINESS OUTLOOK

Competition Ahead—Many production records will be set this year. But in spite of overall good predic-



tions, some bears are on the prowl. Extreme optimism of a few months ago has not settled down to a realistic appraisal. P. 53

LABOR

Management Stiffens — The usually quite personnel conference of American Management Assn., bristled this year as executives served notice on labor they're ready to take a stand. P. 55

RESEARCH AND SALES

They Go Together — You aren't making the best use of your research groups if they don't work with sales and manufacturing. They can come up with more usable ideas if they market needs. P. 56

HELP FOR TOOLBUILDERS?

Washington Shows Concern — Warnings the U. S. machine tool

Metalworking

Cover Feature

CUTTING OILS, COOLANTS — More mileage per drop of cutting fluid is of vital interest to all companies that use machine tools. This week's special report points out how you can spend your "Cutting Fluids Dollar" most wisely. Gulf Oil Corp. photo. P. 87

industry is losing its strength have stirred up action by the government. Four studies are suggested to get at causes of the problem. P. 57

WEST COAST

Busy Missilemakers — Major aircraft and missile producers in Farwest are having a good year. Debates on defense program will keep pressure on aerospace spending. P. 75

Engineering-Production Developments

HOW TO GET MORE FROM CUTTING FLUIDS DOLLAR

Cutting Fluid Functions — Main uses of cutting fluids include: Removal of heat from the cutting tool, chips and workpiece as quickly as possible; and reduction of friction between the sliding chips and the cutting tool. To reduce friction, cutting fluids must reach the chip-tool interface. And, to do their job properly, the cutting fluids must withstand high pressures and temperatures. P. 87

Match to Job — Selection of proper cutting fluids is no simple matter. Each job must be considered on its own merits. No factor should be overlooked. At best, your selection will probably be a compromise among the variables and factors that influence your operations. P. 90

Metals Influence Selection — some metals are brittle, others ductile. Some are coarse-grained; others are fine-grained. Whatever the metal's characteristics, it will affect your choice of cutting fluid. Grain size provides a key to cutting ease. The larger the grain, the more brittle the metal. P. 93

Tooling Takes Beating—Cutting tools face all sorts of metals and conditions. They must withstand these conditions under extremes of pressure, heat and shock. Poor lubrication and cooling allow excessive wear. Selection of the proper cutting fluid prevents tool tips from overheating. P. 96

Meet the Need — Cutting fluids can't be effective unless they're properly used. To receive full benefit, fluids must reach the working zone and stay there until the job is completed. Premixing is one of the best ways to control cutting fluids. Storage, extraction, service life and reclaiming are important. P. 100

Market and Price Trends

IRON ORE PRICES

Imports Stall Increase — A price increase for Venezuelan iron ore won't be passed on to U. S. customers. And domestic shippers look for a good shipping season with no price increases. P. 58

MATERIALS MANAGEMENT

Procurement Concept—The idea of a centralized authority to control flow of all materials from ordering through inventory control is catching on in industry. Some drawbacks and limitations are charged and some conceded, but it's a hot subject in procurement and manufacturing circles. P. 64

MACHINE TOOLS

Spark Machining — New British equipment for spark erosion machining has been simplified. It produces quality dies faster and at a lower cost than by conventional methods, says the builder. P. 77

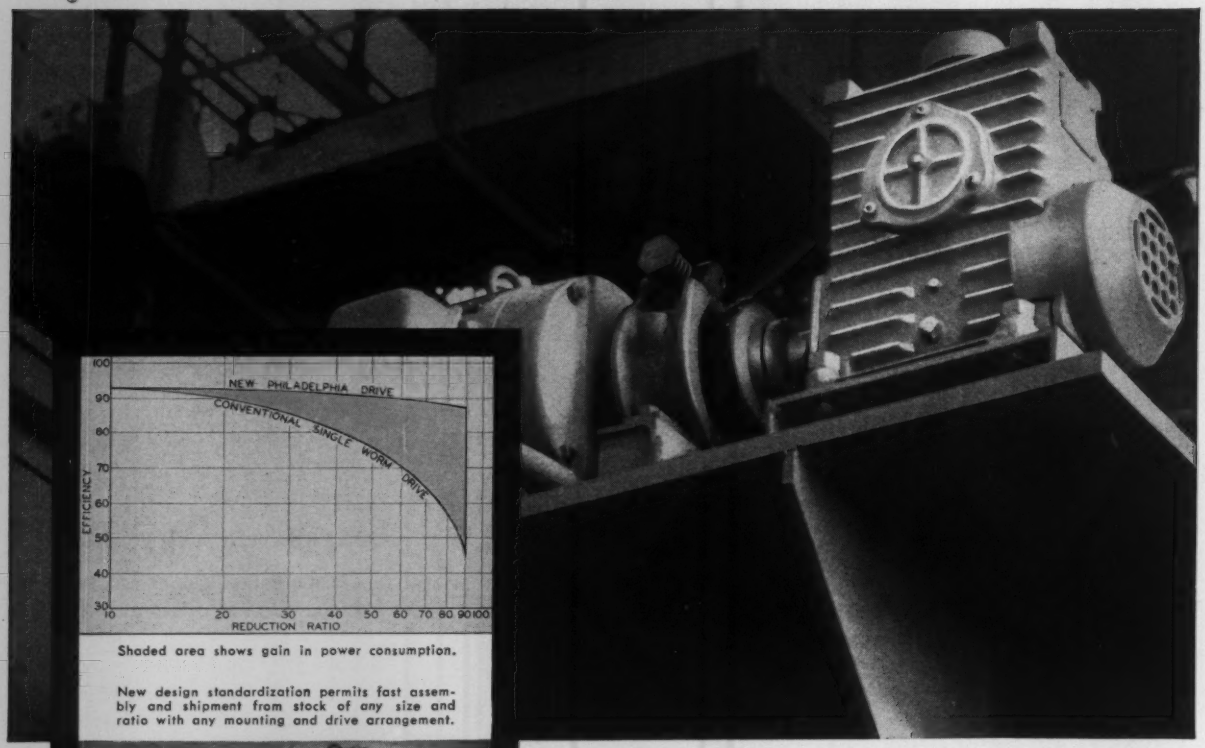
STEEL SUMMARY

Looking Better — A secondary wave of steel demand is beginning to support the steel market. New orders from a wide range of sources are stabilizing the market for most products. P. 147

NEXT WEEK

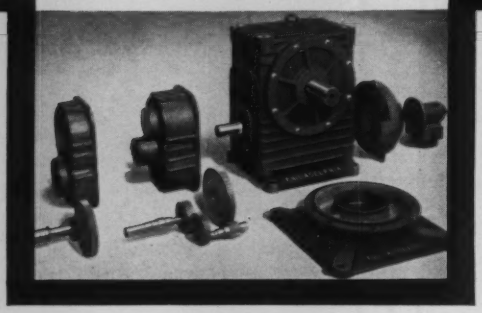
NUMERICAL CONTROLS

Uses Grow—After years of development numerical controls are coming into their own. Next week's special report will tell how management is looking to them to help drive down manufacturing costs.



Shaded area shows gain in power consumption.

New design standardization permits fast assembly and shipment from stock of any size and ratio with any mounting and drive arrangement.



NOW get new efficiency new savings in weight and space in worm gear drives

New high efficiency. These new drives offer efficiencies never before available in worm gear drives. Helical attachments for double and triple reduction units combine the efficiency advantage of helical gearing with the high ratio advantage of worm gearing. You save on power consumption . . . operating temperatures are lower . . . gearing lasts longer.

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New flexibility. These new heavy duty high efficiency Philadelphia drives have a degree of flexibility never before available. One basic housing design can be combined with standardized horizontal and vertical mounting bases, worm gearing, single and double helical attachments, and fans, for any drive and mounting arrangement in the exact size and ratio to meet your requirements . . . standard or special. Torque control attachments for all sizes are available from stock for applications demanding overload protection. Ratios from 5⅛ : 1 to 1212 : 1. Center distances from 3″ to 21″. Write for catalog information.

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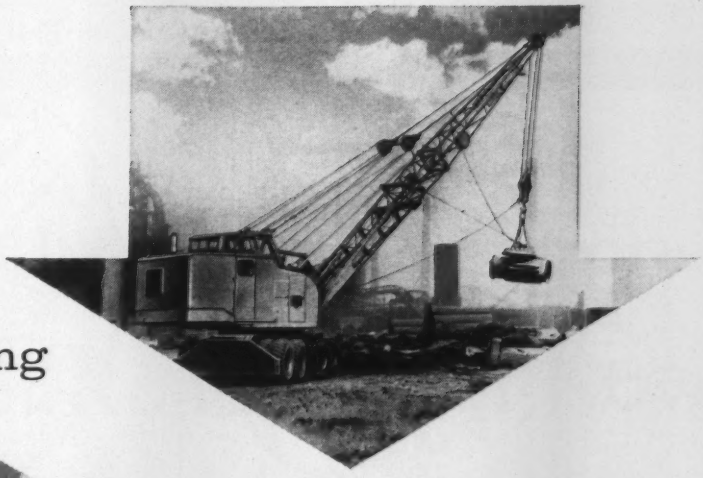

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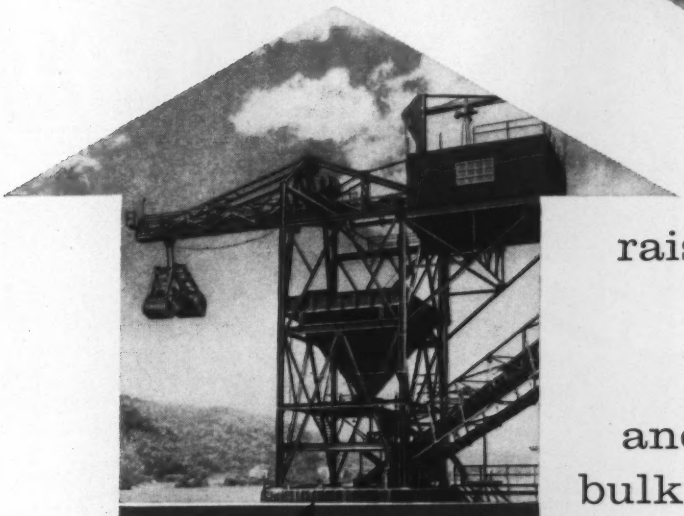
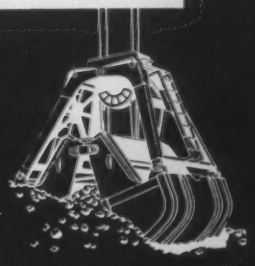


raising

and moving heavy bulk material

Industrial Brownhoist
cranes and bridges



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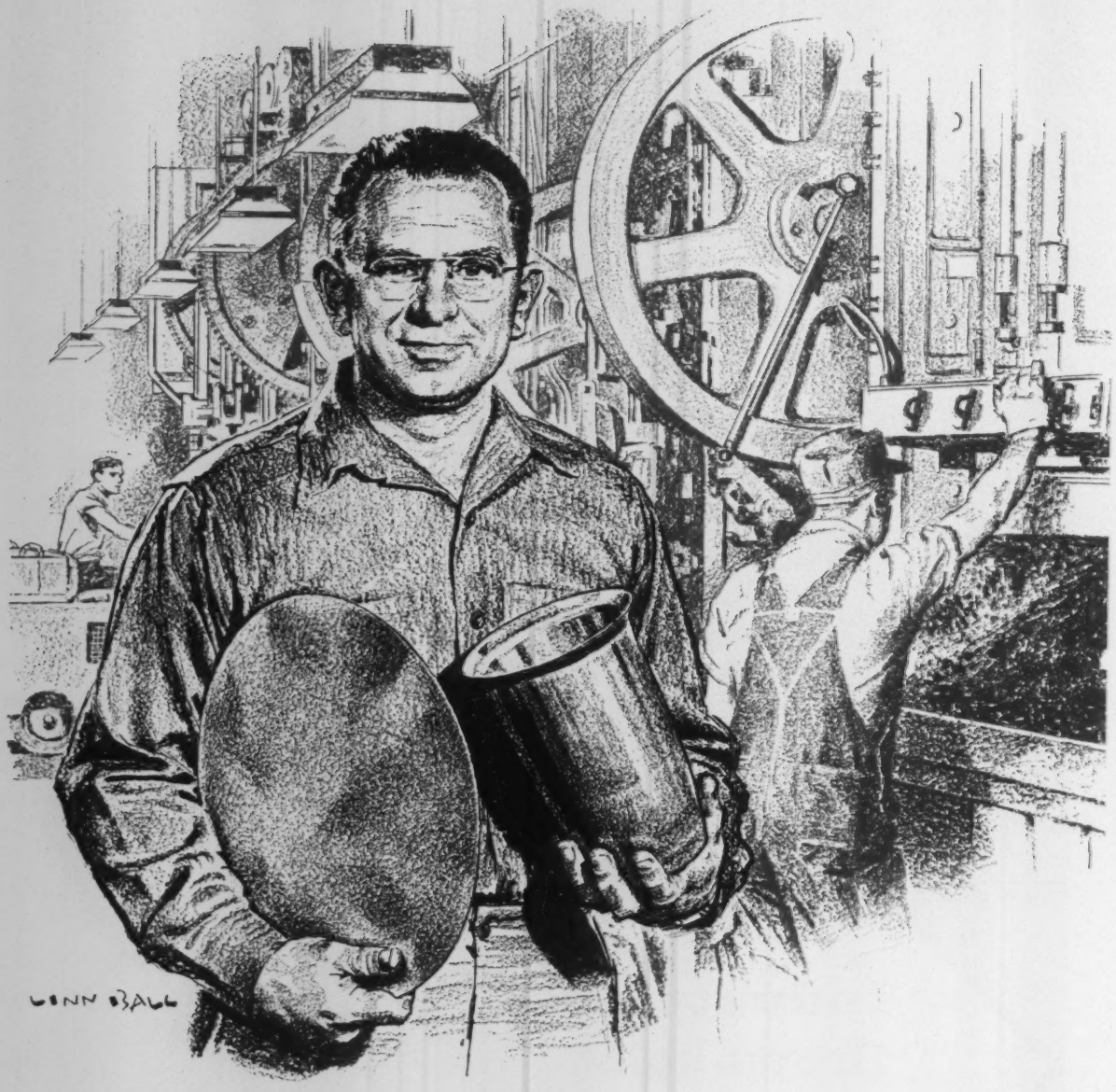

"For extra deep drawing we like Sharon Quality Stainless Steels"

— WALTER MARKOWSKI, Pressroom Foreman
S. W. FARBER, Inc.

"Here at Farber we really put stainless steel through severe tests," says Walter Markowski, pressroom foreman. Our product design calls for extra deep draws, delicate rolled edging and bright flawless finishes. Over the years we have found a most dependable source of prime stainless steels in the *Sharon Steel Corporation, Sharon, Pa.*"

SHARONSTEEL **SHARON** *Quality* **STEEL**

The Fabulous Competition: Better Get Ready For It Now!

It used to be fun dreaming about the fabulous sixties. The general idea was we would lie on the beach while the slaves processed the orders. Then we would wait for the treasurer to send on our checks.

It was great while we dreamed. Now we are in the fabulous sixties—the start of them. They sure are fabulous, but for different reasons.

We find that European firms not only have cheaper prices, but they have excellent products. Also, they seem to have an industrial know-how that amazes us. But it shouldn't.

Then when we look to Japan we see an industrial explosion there. The Japanese are going to town on all manner of products which are selling like hot cakes here and elsewhere.

Russia isn't doing so badly either. She is right in our backyard in Cuba and eyeing South America. Chances are she will build plants and equipment there in barter arrangements.

Our labor has been so busy getting top-level wage-fringe rates that no time was spent worrying where it would end up. Now it begins to dawn on some union people that some of our plants are moving abroad, more goods are coming here at cheaper prices and new plants and techniques are blossoming all over foreign lands.

A tariff wall won't solve the problem at all. To expect American labor to take a wage cut won't get to first base. And to sit back and wait for it to clear up is no answer.

There will be no end to stiff competition from abroad. It will become more intense, more far-reaching and harder to overcome. But it can be met. It can be equalized, if not overcome. But it may take a lot more than some of us are willing to give.

Older equipment is out for keeps. New ideas and techniques are a must. Not just talk, but the actual thing done—or started. And the best way to start is to study what our friends outside our borders are doing, how they are doing it, and how we can do as well or better.

This means more appropriations for new plant and equipment, more for industrial and market research, more for on-the-spot study of the problem.

The challenge will remain. It must be met. This is the time for imagination and chance taking —and the time for a new pioneer spirit!

Tom Campbell

Editor-in-Chief

CASE HISTORIES

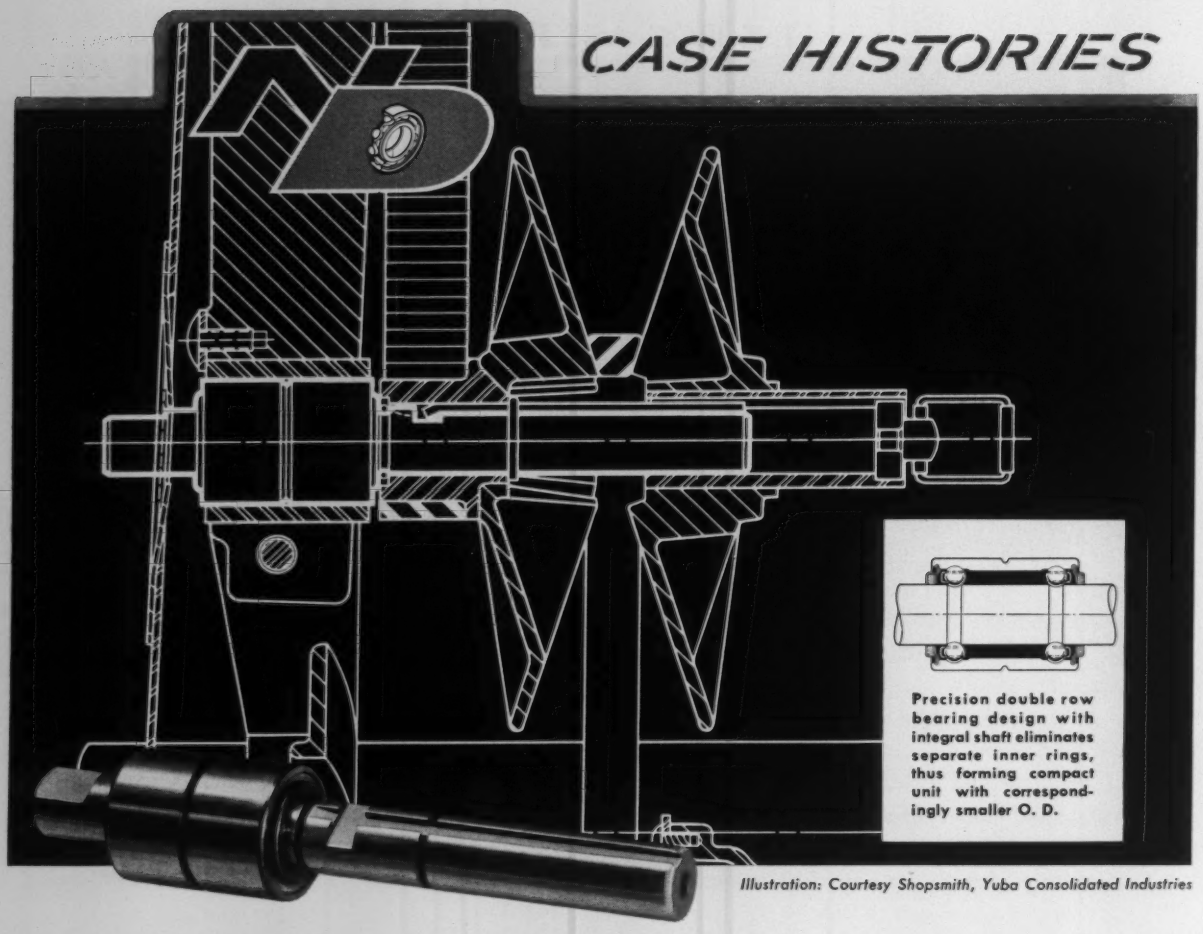
Precision double row bearing design with integral shaft eliminates separate inner rings, thus forming compact unit with correspondingly smaller O. D.

Illustration: Courtesy Shopsmith, Yuba Consolidated Industries

N/D Bearing Solves Home Power Tool Speed Changing Problem!

CUSTOMER PROBLEM:

Require low cost, compact idler shaft assembly for speed changer in popular, multi-purpose home power tool. The assembly must mount on ball bearings . . . operate at speeds up to 6000 RPM.

SOLUTION:

N/D Sales Engineer, cooperating with customer engineers, recommended a *single* N/D ball bearing —a compact integral shaft unit designed as part of idler assembly. The unit permits one of two interlocking variable pitch pulley halves to slide axially on shaft when changing pitch at high speed. This precision, automotive type fan and water pump bearing eliminates extra parts inventory and shaft machining . . . reduces assembly time. In addition to solving complex design problem, N/D's compact heavy-duty ball bearing is integrally sealed for protection against saw-generated dust . . . and lubricated-for-life for added end user sales appeal!

If *you're* designing new equipment, why not call your New Departure Sales Engineer. He probably can help engineer your application with a standard, volume-produced N/D ball bearing that will help solve your bearing problem. For more information contact New Departure Division, General Motors Corporation, Bristol, Connecticut.

Replacement ball bearings available through United Motors System and its Authorized Bearing Distributors.

NEW DEPARTURE

BALL BEARINGS

proved reliability you can build around

Meets Use at 1500°F

Gallium phosphide, a yellow compound that resembles glass, withstands temperatures up to 1500°F. The compound is made from a mixture of gallium, a rare silvery metal costing about $1500 per pound, and phosphorus. Proposed uses: building solar-cell power plants for space stations, and small rugged electronic parts for missiles, satellites and future space probes.

Provides Hard Coatings

Chromium carbide, titanium carbide, tungsten carbide and chromium boride are being evaluated for coating applications. Applied by metallizing or flame spraying, pure or combined with metal binders, these compounds provide coatings which have high hardness and good oxidation resistance.

Massive Aluminum Assault

A spokesman for the industrial design department of a major aluminum producer reports, privately, that his company is currently firming up plans for a massive assault on the architectural market. While final plans aren't made yet, it looks like the company's designers will actually design sample buildings, along with advising potential customers.

Automation Beats Imports

Tool builders are scoring major technical advances in automatic handling of bulk items such as nails. Magnetic techniques are the key. The resulting automation lines will lift these basic steel products back into contention for domestic markets; thus beating the advantages of foreign wage rates.

X-Ray Unit Fits in Hand

Experiments are being made with the first complete X-ray source small enough to hold in one hand. Source is Samarium-153, a low-energy radioisotope. Radioactive SM-153 and its shield weigh 18 lb. The new unit paves the way for use of X-rays where operation of a normal X-ray machine is impossible. Although it has only a two-day life, SM-153 may be the forerunner of other longer lived isotopes with similar characteristics.

Taps 70,000 Nuts per Hour

New wrinkle in a multiple-spindle nut tapper is a vibrating turntable feed which fixes 49 nuts for simultaneous threading. The unit taps up to 70,000 nuts per hour. Originally developed for drilling gas burners for stoves, the machine can drill 1800 holes in a 6 x 8 in. printed circuit laminate. Another major use is depth hole drilling of acoustic tile.

Lubricates at High Heats

Metal-free phthalocyanine shows promise as a high-temperature lubricant. This material has remarkable thermal stability for an organic compound. Its molecule has a planar structure which makes it a good solid lubricant. Tests at 800°-1300°F show that phthalocyanine reduces friction to a low level; this greatly decreases wear on moving parts at elevated temperatures.

Boom in Soviet Output

General purpose lathes are being mass produced in the Soviet Union. According to Western visitors to Russian plants, these lathes are of acceptable quality. In price, they are 62 pct cheaper than comparable lathes made in Western Europe. One Western engineer states that Russia is the only nation in the world actively engaged in the mass production of machine tools.

Form Plastic Fenders

Reinforced plastic for truck and coach fenders is moving past the design stages. High manufacturing costs are offset by the long life and low weight of the plastic fenders on commercial vehicles where deadweight boosts operating costs and reduces payloads.

This LPR Tag

on your Brite Wire coils means greater efficiency in your fabricating operations —at no added cost

Typical *LPR Savings as reported by Users (See Note)

- **Downtime frequency due to coil changes and setup adjustments cut as much as 95%.**
- **Cumulative coil-end scrap trimmed to the bone.**
- **Man-hour costs slashed (20% and more is common).**
- **Material handling time and expense substantially reduced. Unloading time alone cut from 16% to 50%.**
- **High density, self-supporting coils release 15% to 20% of storage space for more productive uses, improve inventory management.**
- **Machine productivity increased . . . for example, 1 man now operates 4 machines against 3, previously.**
- **"Returnable-carrier" problem and small storage racks eliminated.**

NOTE—Savings and improvements cited were experienced following switch from traditional mill weight bundles (150 pounds to 400 pounds).

Look Into *LPR's Yourself

Our Portsmouth Division pioneered the development of *LPR coils in the early 1950's. PURPOSE—to improve efficiency and reduce costs in our own Welded Wire Fabric operations.

We'll gladly share our experience with you if you're a Brite Wire fabricator. We also invite you to visit our Portsmouth Mill to see for yourself how *LPR's perform. For an appointment or for further information on any DSC products, please call your nearest DSC Customer "Rep" or write Detroit Steel Corporation Box 4308, Detroit 9, Michigan.

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The Agency Shop

Sir—This letter is in reference to your article "The Agency Shop," IRON AGE, Feb. 11, 1960.

The Union maintains that a non-member must pay the Union a service fee even though the non-member has not solicited the Union's services. Let's look at this agency fee business from another angle. When the Union does a non-member a disservice, that is, when the Union is responsible for keeping a non-member away from his job as a result of a strike the Union calls, and the non-member wishes to work, can the non-member sue for triple damages?

The service a non-member desires is work without strike interruption.—F. Weiss, Gary, Ind.

"Defense Posture"

Sir—Thank you very much for sending me the tear sheet of The IRON AGE editorial, ("So What Must We Do About Our Defense Posture?").

I consider the editorial an excellent one, thoughtful and penetrating in its analysis. The hearings before this committee, which have been going on for several weeks, are uncovering much useful information on our national space program, as you may know. We hope the results will be translated into a dynamic, accelerated program, one that will return to our country the prestige Russia has captured by her space exploits, and one that will give us the defense we need.—Overton Brooks, M. C., Chairman, Committee on Science and Astronautics, House of Representatives, Washington.

Galvanized Steel

Sir—On page 121 of The IRON AGE for February 11, 1960 there is an article in the automotive section about Ford and GM using galvanized steel.

While we, of course, do not produce the galvanized steel, but rather are job galvanizers, applying the galvanized coating to fabricated products, we are most interested to read in this era of plastics and substitute products and coatings, that a major industry is relying again on one of the recognized basic processes.

We would like very much to have a dozen reprints of the article.—S. J. Swensson, Jr., Vice Pres., The Witt Cornice Co., Cincinnati, O.

▪ **Reprints are on the way.—Ed.**

Hot Cracking Test

Sir—We have been interested to note the reference on Page 9 of The IRON AGE, 21st January, 1960, to the hot cracking test devised by Westinghouse, and should be very grateful if you could give us the reference of any other further literature on this topic.—D. Whale, Tube Investments Dept. of Technical Information, Birmingham, England.

Contact M. C. Kozikowski, Westinghouse Electric Co., P.O. Box 2278, Pittsburgh 30, Pa.

"For he's a jolly good fellow, for he's a jolly good fellow. . . ."

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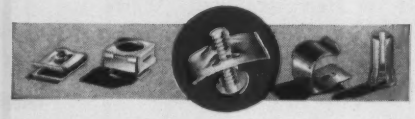


FASTEST THING IN FASTENINGS®

CANADA: Dominion Fasteners Ltd., Hamilton, Ontario. GREAT BRITAIN: Simmonds Aerocessories Ltd., Treforest, Wales. FRANCE: Simmonds S. A., 3 rue Paleman de Rotschild, Suresnes (Seine). GERMANY: Mecano-Bundy GmbH, Heidelberg.

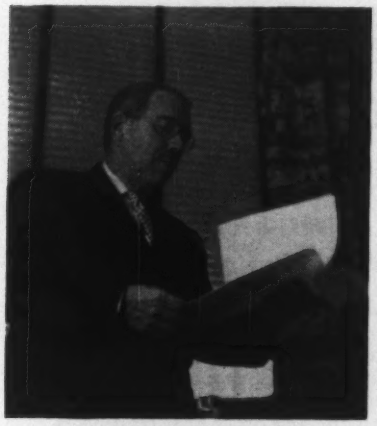
FATIGUE CRACKS

"Dear Abby"

Are you tired of pompous phrases on how to run your job? Are you fed up with long-winded essays on the scientific management of people? Do the pedantic mouthings of some fancy consultants give you a pain in the neck?

If so, then you are in for a delightful surprise in a new book* by Dr. Robert N. McMurry, our favorite writer on how to deal with the people who work for you.

No Nonsense—Dr. McMurry has a commonsense way of telling management how to solve everyday problems in handling people. There are 89 in the book. Typical: "What do you do when you find you've promoted the wrong man? How do you really find out what previous employers think of a job applicant?"



Consultant McMurry: "Light reading for serious people."

As many an IRON AGE reader knows, Dr. McMurry is a top-notch Chicago management consultant. In his new book, just published, he uses a question and answer technique to discuss some problems that have been thrown at him.

Example:

Question: My vice-president for sales, who has been with us for twenty-eight years and is a fabulous personal salesman, is beginning to drink a little too much. More accurately, he is not handling liquor as well as he did, because he has always been very handy with the bottle. Just last week he appeared at a 9 a.m. meeting of our regional managers in a very muddled state . . . Furthermore, his wife is becoming a problem drinker too . . ."

Answer: You have two problems, not one. The first is in the person of your vice-president for sales . . . it is probable that the chief root of his difficulty lies in the fact that he is over his head on his job . . . Is he overloaded? Does he need more help? . . .

We heartily recommend "McMurry's Management Clinic" for plane, train or home reading. You'll pass it around among your associates.

We're on safe ground here because we recall the avalanche of letters that greeted Dr. McMurry's latest series in The IRON AGE on the Problem Employee. (It appeared in our issues of August 6, 13 and 20, 1959—and it drew more than 1100 letters asking for reprints).

---

*"McMurry's Management Clinic," by R. N. McMurry, in collaboration with R. G. Shaeffer and E. deNeufville. $4.95. Simon and Schuster, 630 Fifth Ave., New York 20, N. Y.

Appalachian Conclave

The IRON AGE got a hot news tip last week. There's going to be another Appalachian Underground meeting. In fact we even got a list of some of the attendees.

Only this one won't be attracting the same types as showed up for the infamous convention in New York State a couple of years ago. The tip we got was that the 1960 Appalachian Underground Corrosion Short Course will be held in June at The West Virginia University, Morgantown, W. Va.

Annual Event — The course is held annually at the University, and this year will cover eight main groups of underground corrosion.

CVR-610

CONSTANT VOLTAGE REFERENCE INSTRUMENT POWER SUPPLY

for those difficult environmental applications in which loss of control or shut down due to battery failure cannot be tolerated

Install the CVR-610 without tools or instrument modification. A direct replacement for #6 or 4FH battery, it can be installed with very little more time and effort than is required to change a dry cell. Use with Leeds & Northrup, Brown, Minneapolis Honeywell and others.

$62.50

SPECIFICATIONS

OUTPUT
1.5 Volts DC nominal will supply either 6 or 10 MA circuits.

STABILITY
Within 0.1% with line variations from 105 to 125 volts, 50 to 60 cycles.

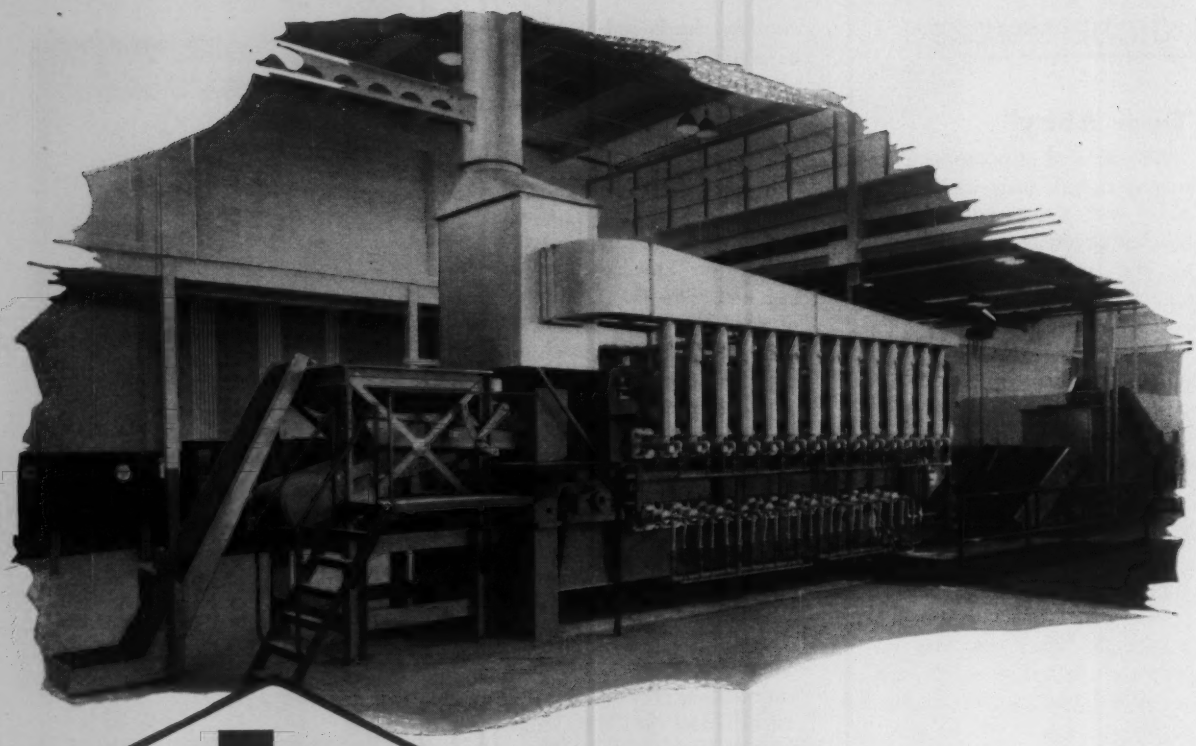
NOISE
Injects less than 10 microvolts into standard measuring circuits.

TEMPERATURE
Minus 20 to + 140° F.

PM *instruments can measure:*
LOAD • THRUST • TORQUE • FLOW WEIGHT • TEMPERATURE • DISPLACEMENT VOLTAGE • PRESSURE with the highest accuracy attainable in industrial and laboratory applications.

PM

PERFORMANCE MEASUREMENTS COMPANY
15301 W. McNichols, Detroit 35, Mich.



THE ELECTRIC **EF** FURNACE CO.

GAS • OIL • ELECTRIC

Chain Belt Conveyor Furnaces

for scale-free hardening, carbon restoration, carburizing, carbonitriding or non-decarb heat treatment of — bolts, rivets, springs, bearing cups and races, and a wide variety of other small and medium size parts.

The material to be treated is loaded directly onto the specially designed, long wearing, heat resisting, cast alloy link conveyor belt; is carried through the furnace; uniformly heat treated; and discharged automatically through a sealed chute to EF continuous quenching equipment;—and either carried on through washing equipment and draw furnace, or passed directly to tote boxes. No pans or trays are needed thus avoiding heating this additional weight, and assuring high fuel economy.

Furnished in 15 standard sizes, capacities from 175 to 3,000 lbs. per hour giving you a wide range to choose from, assuring prompt delivery and minimizing charges for new engineering. Gas or oil fired radiant tube—or electrically heated—whichever suits your requirement best.

The furnace is usually furnished complete with EF special atmosphere generating equipment; oil, water or dual oil and water quench; washing equipment and all needed material handling facilities.

Ask us also about our wide experience in designing and building wire mesh belt, car bottom, roller hearth, roller rail, catenary, bulkhead tray, walking beam, bell, pit, rotary, screw and other types of furnaces for annealing, normalizing, galvanizing, coating, brazing, sintering, billet heating, malleablizing and other heat treatments.

For any ferrous or non-ferrous furnace heat treating project you will find "It pays to call the EF heat treating engineers". Let us work with *you* on *your* next project!

SEND FOR BULLETIN NO. 591

Twenty pages. It illustrates and describes the many different types of furnaces we build, and the applications in which each is used. **Write for your copy TODAY!**

EF

THE ELECTRIC FURNACE CO.

Gas-fired, Oil-fired and Electric Furnaces for Heat Treating any Product, Using any Process, any Hourly Output.

400 West Wilson Street *Salem - Ohio*

Branch Offices in Detroit, Mich., Santa Ana, Calif., and Cheshire, Conn. Canadian Associates, Canefco Limited, Toronto 13, Ontario

COMING EXHIBITS

Corrosion Show — March 14-18, Memorial Auditorium, Dallas. (National Assn. of Corrosion Engineers, 1061 M & M Bldg., Houston)

Tool Show—April 21-28, Detroit Artillery Armory, Detroit. (American Society of Tool Engineers, 10700 Puritan, Detroit 38.)

Welding Show—April 25-29, Great Western Exhibit Center, Los Angeles. (American Welding Society, Inc., 33 West 39th St., New York 18.)

1960 Castings Congress & Exposition—May 9-13, Convention Hall, Philadelphia. (American Foundrymen's Society, Golf & Wolf Rds., Des Plaines, Ill.)

Southwestern Metal Show — May 9-13, State Fair Park, Automobile Bldg., Dallas, Texas. (American Society for Metals, Metals Park, Novelty, O.)

Design Engineering Show — May 23-26, Coliseum, New York. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

Production Engineering Show—Sept. 6-16, Navy Pier, Chicago. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

Machine Tool Exposition—Sept. 6-16, International Amphitheatre, Chicago. (National Machine Tool Builders Assn., 2139 Wisconsin Ave., Washington 7, D. C.)

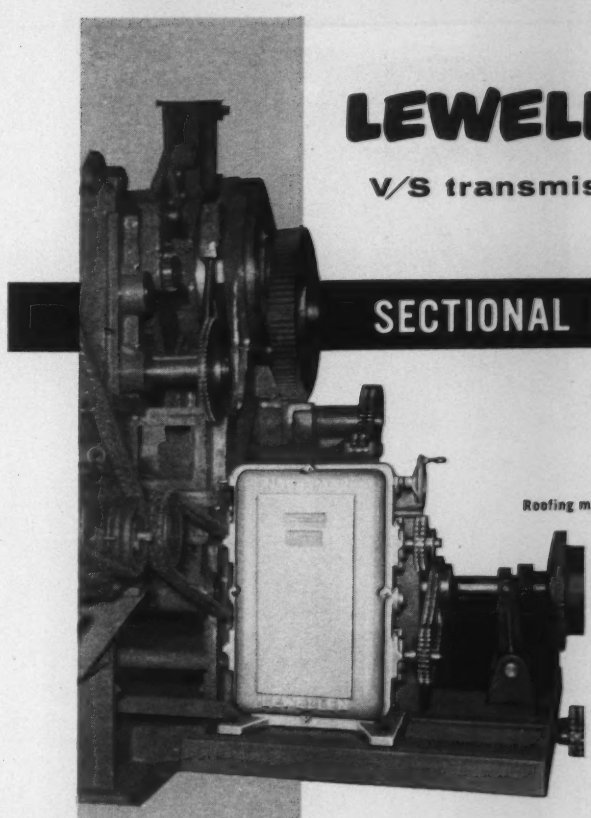
Iron & Steel Show—Sept. 27-30, Cleveland Public Auditorium, Cleveland, O. (Association of Iron & Steel Engineers, 1010 Empire Bldg., Pittsburgh 22.)

MEETINGS

MARCH

Can Manufacturers Institute, Inc. —Annual meeting, March 7, Waldorf-Astoria Hotel, New York.

(Continued on P. 16)



LEWELLEN

V/S transmissions

SECTIONAL DRIVES

Roofing machinery shingle cutter section.

INFINITELY VARIABLE SPEEDS

WIDE SPEED RANGES

FINE SPEED CHANGES

PRECISE SPEED SETTINGS

ACCURATE SPEED RESETTING

Machine sections must produce a wide range of product treatments and dimensions.

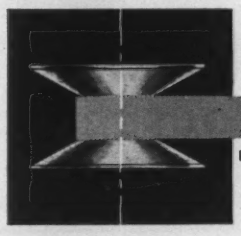
Infinitely selective operation is obtained by incorporating the LEWELLEN V/S Transmission with the sectional drive.

Widely variable to finely adjustable speeds become available, conveniently and immediately. A single or group of machine sections then integrate at production rate, while remaining individually controllable.

The LEWELLEN V/S Transmission installs and connects readily with the sectional power train.

The LEWELLEN may be motor or machine driven. It operates in the range of machine speeds. Speeds are adjustable while running — or not running.

There is a selection of ratings to 60 h.p. — speed ranges to 20:1 . . . a selection of mountings, enclosures, controlling devices.

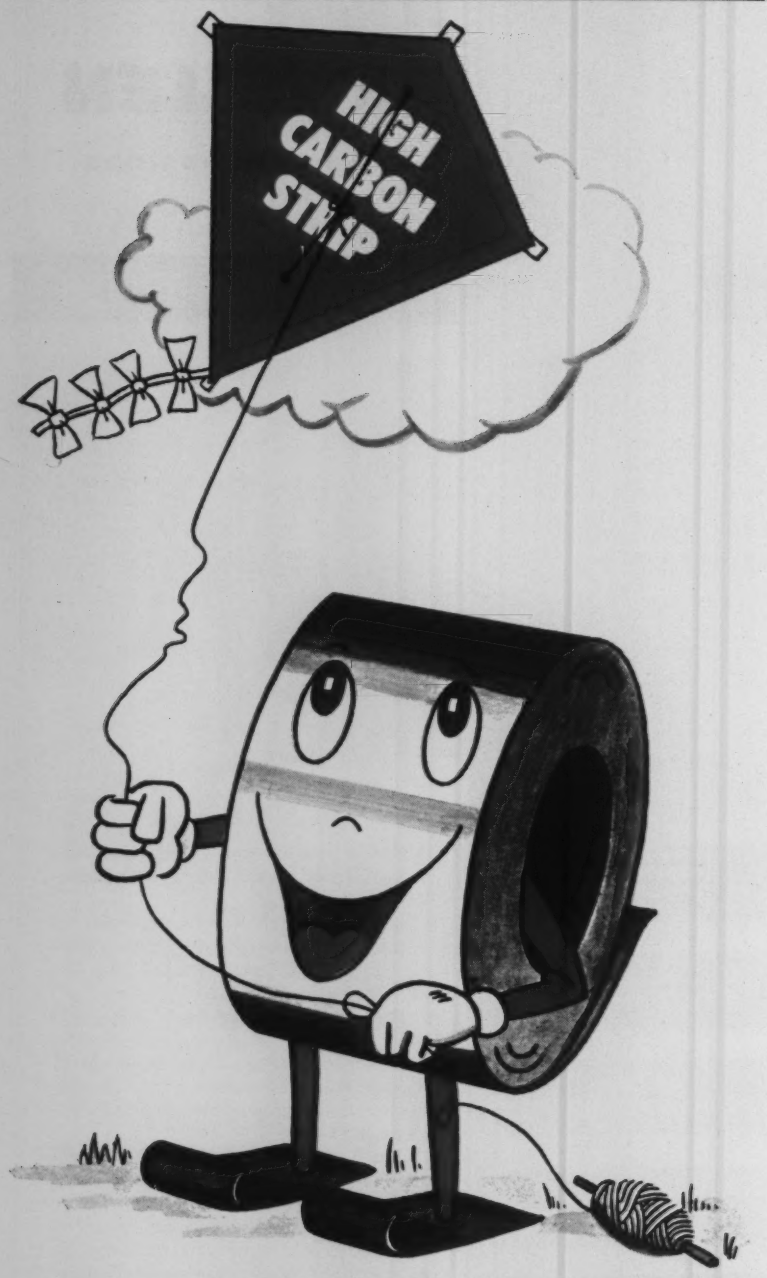


Catalog 65 may prove helpful—write for it.

LEWELLEN

Manufacturing Company, Columbus, Indiana

Distributors in all Industrial Areas



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STEELS, INC.
THE 52100 HOUSE
UNION, NEW JERSEY · WETHERSFIELD, CONNECTICUT
DETROIT, MICHIGAN · MELROSE PARK, ILLINOIS

MEETINGS

(Continued from P. 15)

Institute headquarters, 821—15th St., N. W., Washington 5, D. C.

Assn. of Iron & Steel Engineers—Western meeting, March 7-9, St. Francis Hotel, San Francisco. Association headquarters, 1010 Empire Bldg., Pittsburgh.

Manufacturers Standardization Society of the Valve & Fittings Industry — Annual meeting, March 8-10, The Barbizon-Plaza Hotel, New York. Society headquarters, 420 Lexington Ave., New York.

Aluminum Extruders Council—Quarterly meeting, Mar. 9-11, Arawak Hotel, Jamaica, W. I. Council headquarters, 1015 Chestnut St., Philadelphia.

National Assn. of Waste Material Dealers, Inc.—Annual convention, March 12-15, Waldorf - Astoria Hotel, New York. Association headquarters, 271 Madison Ave., New York 16, N. Y.

Fire Equipment Mfrs. Assn.—Annual meeting, March 15-16, Barbizon-Plaza Hotel, New York. Association headquarters, 759 One Gateway Center, Pittsburgh.

Society for Non-Destructive Testing—Third international conference, March 15-21, Tokyo, Japan. Society headquarters, 1109 Hinman St., Evanston, Ill.

Electronic Industries Assn.—Spring conference, March 16-18, Statler Hilton Hotel, Washington. Association headquarters, 1721 DeSales St., N. W., Washington.

Scale Mfrs. Assn., Inc. — Spring meeting, March 22-23, Washington. Association headquarters, One Thomas Circle, Washington.

Pressed Metal Institute — Spring technical meeting, March 23-25, The Pick-Carter Hotel, Cleveland. Institute headquarters, 3673 Lee Rd., Cleveland.

NOW HE KNOWS WHY

lubrication is a management responsibility

MANAGEMENT *does* have a stake in good lubrication practices.

If you recognize lubrication for what it is — a cost-reducing tool, not an expense item — you can effect savings that add up to many hundred times the cost of the lubricants themselves. Yet only management has the authority to make these potential savings an actuality. That's why lubrication is your responsibility. **Texaco can help you achieve these savings.** Texaco Lubrication Engineers have had valuable experience in tailoring Organized Lubrication Programs to the needs of virtually every industry. They can help show *you* the way to important savings. Why not talk to your nearest Texaco Lubrication Engineer today — or write for our new Book "Organized Lubrication — Major Cost Control Factor."

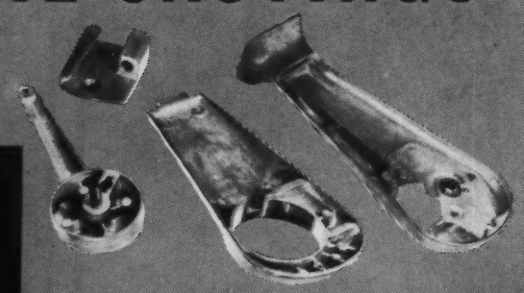
Texaco Inc., 135 East 42nd Street, New York 17, New York. Dept. IA-141

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

AND MARKETABILITY...

Build Your Product With

ZINC DIE CASTINGS



• FINISH WELL • WEAR WELL
• ARE LOW IN COST

Out of the myriad materials available, this manufacturer used zinc die castings in their wall can opener because they:
The Rival Manufacturing Co.'s, "Can-O-Mat" and its four components die cast in zinc at right.

These advantages enabled the manufacturer to market the opener successfully in a highly competitive field where style, flawless finish and moderate cost are prime requisites.

Industry's preference for zinc as a base for die castings is indicated by the fact that, normally, zinc alloys account for about two-thirds by weight of all die castings used annually. This is due to ease of casting and finishing, excellent physical properties, close dimensional tolerances and the wide variety of beautiful finishes which can only be attained with die castings based on 99.99+% zinc.

Die Casting is the Process...Zinc the Metal...

BUNKER HILL 99.99+% ZINC

EASTERN SALES AGENTS
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SALES OFFICE FOR PACIFIC COAST
THE BUNKER HILL CO., 660 MARKET ST., SAN FRANCISCO, CALIF.

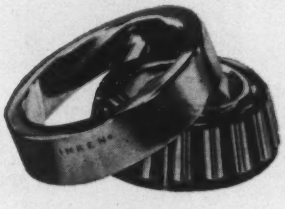
ZN-147

BUNKER HILL

the Preferred Zinc

THERE are two big reasons why the trade-mark "Timken" guarantees top bearing value. 1.) It assures you of uniform high quality and performance. From the steel right through to final inspection, Timken® bearings are made to the industry's most exacting specifications. 2.) You're assured of the finest bearing service available.

"Timken" is the registered trade-mark that identifies tapered roller bearings, fine alloy steels and removable rock bits made by The Timken Roller Bearing Company. For your guarantee of value, specify "Timken". The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".



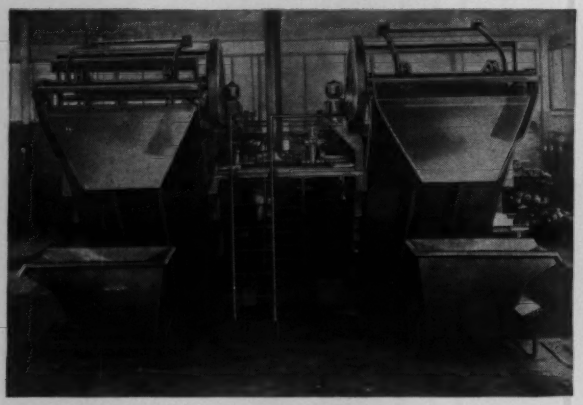
BETTER-NESS rolls on

TIMKEN®

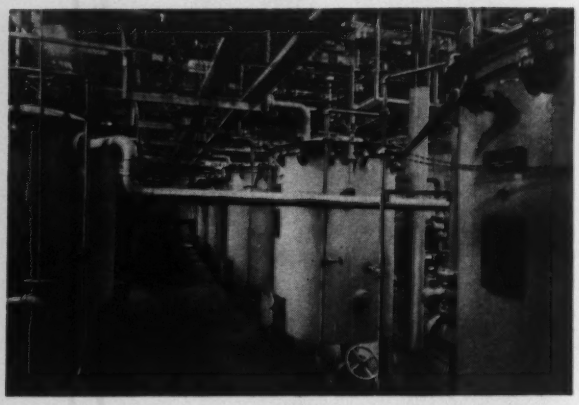
tapered roller bearings

Today's high production costs dictate a good hard look at metalworking tools and techniques—make a reduction in operating expenditures essential to increased profit margins. Here are typical examples of companies which have obtained maximum production from machine tools by eliminating unnecessary and often hidden expenses through the use of Hoffman filtration equipment.

They're Beating High Machine Tool Costs and Obsolesence



A Hoffman Central Flotation System serving 28 grinding machines at an International Harvester plant. The coolant serving the sickle grinding department is a water-base soluble oil.



A Hoffman Central Filtration System consisting of 9 Hoffman Pressure Filters, Model I-80S, each equipped with Hoffman Dual Magnaflo Plates—with a flow rate of 150 gpm and sludge collector conveyor—(Magnetic separator), are shown at the plant of a leading automotive and aircraft accessory manufacturer.

This system enabled International Harvester to make the following savings:

Cleaning of coolant trenches completely eliminated —savings of $10,000 annually.

Trucking costs for the removal of sludge to a disposal point reduced 65.5%. Saves $8,122.50 annually.

Cost of grinding wheels reduced 47.4% — saves $65,477.19 annually.

Production per grinding wheel increased 134%.

Cost for wheel-change-over reduced 57.3%.

Adding these and others, the total savings for this particular year were significant.

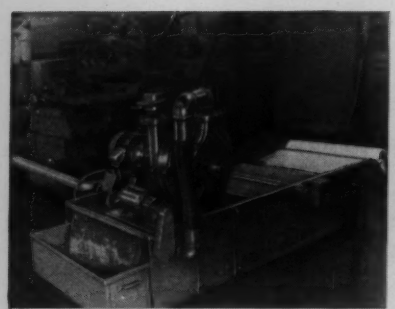
The following tabulation is a percentage breakdown of actual savings made with this Hoffman Central Filtration System equipped with a Magnetic Separator and sludge collector conveyor for automatic removal of sludge collected by filters, magnetic plates and gravity settling.

Grinding Oil 2.5%

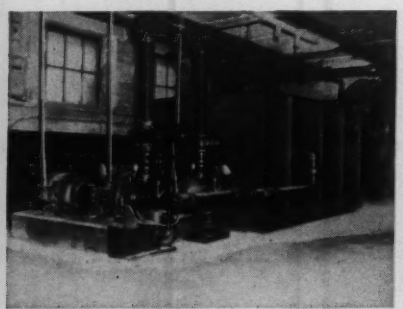
Diamonds—Grinding Wheels 43.4%

Production scrap (resulting from improved quality of product) 32.5%

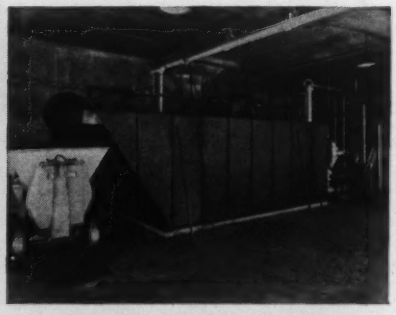
Labor to operate system and actual production labor @ $2.00 per hour 21.6%



A Hoffman Vac-80 Vacu-Matic Filter is shown installed on a Norton 30" diameter stepped-wheel grinder for grinding transmission shafts at the Syracuse plant of a large automotive manufacturer. Most Norton grinders are equipped with Hoffman Vacu-Matic filters when shipped.



At the Union Twist Drill Co. in Athol, Massachusetts, a Hoffman Magnaflo Separator removes metal particles from oils and coolants to solve numerous clarification problems. Result—many money-saving improvements in manufacturing technology and product quality.



A money-saving Hoffman Flotation Unit at the Fafnir Bearing Company. It is designed for plant wide distribution of water-base coolant. The company credits Hoffman systems for great improvement in critical finish grinding operations on bearing races.

The Day Maximation Began

In seeking ways to increase efficiency, production men in the metalworking industry have found elimination of hidden machine tool costs through the use of proper filtration equipment a virtual guarantee of maximum output and economy. This method of obtaining increased production rates is known as *maximation*. Although today, it is one of the most significant factors in determining metalworking profit ratios, the maximation theory and its initial applications were actually developed more than 20 years ago.

HOW MAXIMATION STARTED

A number of months after inspection and delivery of several thousand piston rings to an airplane engine plant, the manufacturer was told that the rings were unsatisfactory and would be returned. Metal particles in the coolant apparently had adhered to the rings during the lapping process and the original high polish finish on the inside of the rings was pitted and chipped on removal from storage. About this time, engineers from the U. S. Hoffman Machinery Corp. were pioneering in research and development of dry cleaning principles for the removal of metal from kerosene coolants. Asked to provide a solution to the problem, they designed a pressure filter system for the clarification of coolants.

THEN AND NOW

This first filtration equipment by Hoffman was a fantastic complex of pipes and valves. But it did a fine job of bringing clean coolant to the work. A few months later, Fafnir Bearing asked for 2 pressure filters "just like the original." From these pioneering concepts have come Hoffman's modern equipment. Today, Fafnir Bearing employs more than a dozen advanced Hoffman individual and central filtration systems.

At Fafnir and in thousands of other plants employing filtration, coolants and lubricants once contaminated by metallic chips, abrasives and other extraneous dirt are no longer responsible for high production, maintenance and costs, as well as premature obsolesence. Through proper filtration, machines originally designed and tested for peak efficiency with clean lubricating oil and clean coolants can now operate at or near rated capacity. Filtration has made it possible to obtain a 30 to 50% savings in grinding wheels, honing stones, broaches, cutting and other edge tools in addition to providing numerous collateral benefits and advantages.

TYPES OF FILTRATION EQUIPMENT

In making recommendations for solving filtration problems, Hoffman engineers draw on a complete line of equipment which includes;

PRESSURE FILTERS—This type of filter gives up to 100% clarity and is widely used with grinding, cutting and honing oils as well as water soluble oil coolants where finest clarity is consistently required. Easily adapted for large groups of machines. Unlimited coolant capacity.

FLOTATION EQUIPMENT—Automatic flotation units increase the productivity of machine tools and eliminate down time for sump cleaning. Provide excellent results in steel and cast iron applications with efficiencies of over 98% in one pass. Handles flow rates from 40 to 1500 gpm.

MAGNAFLOW SEPARATORS—Fully automatic and self-cleaning, Hoffman Magnaflo Separators remove from 75% to 90% ferrous solids from cutting oils and water soluble coolants. Flow rate from 40 to 1,000 gpm.

VACU-MATIC FILTERS — For continuous filtering of coolants from *individual* machine tools. Provides unusually high flow rates in continuous filtration of water soluble coolants. Completely automatic and self cleaning. Flow rates range from 40 to 2,500 gpm.

DISC FILTERS — Filter oils containing finely divided particles. Geared for continuous flow.

SUCTION FILTERS—Provide fine filtration on small flow rates for lapping, microhoning, grinding and similar operations. Cap.5-60 gpm.

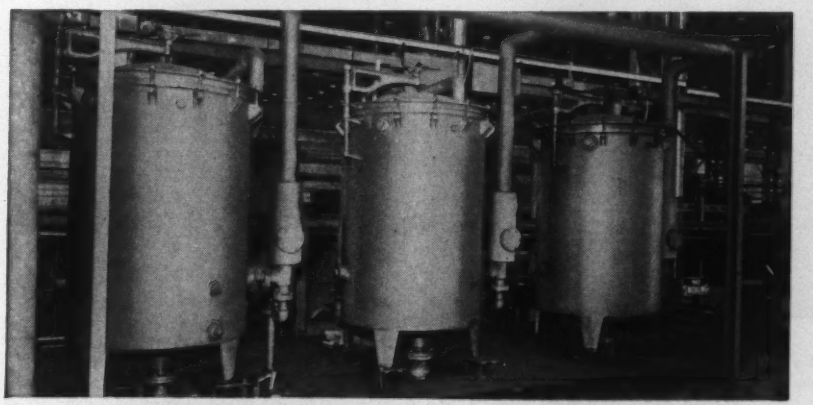
SUMMING UP

Proper filtration delivering clean coolant makes it possible to achieve maximation with these savings.

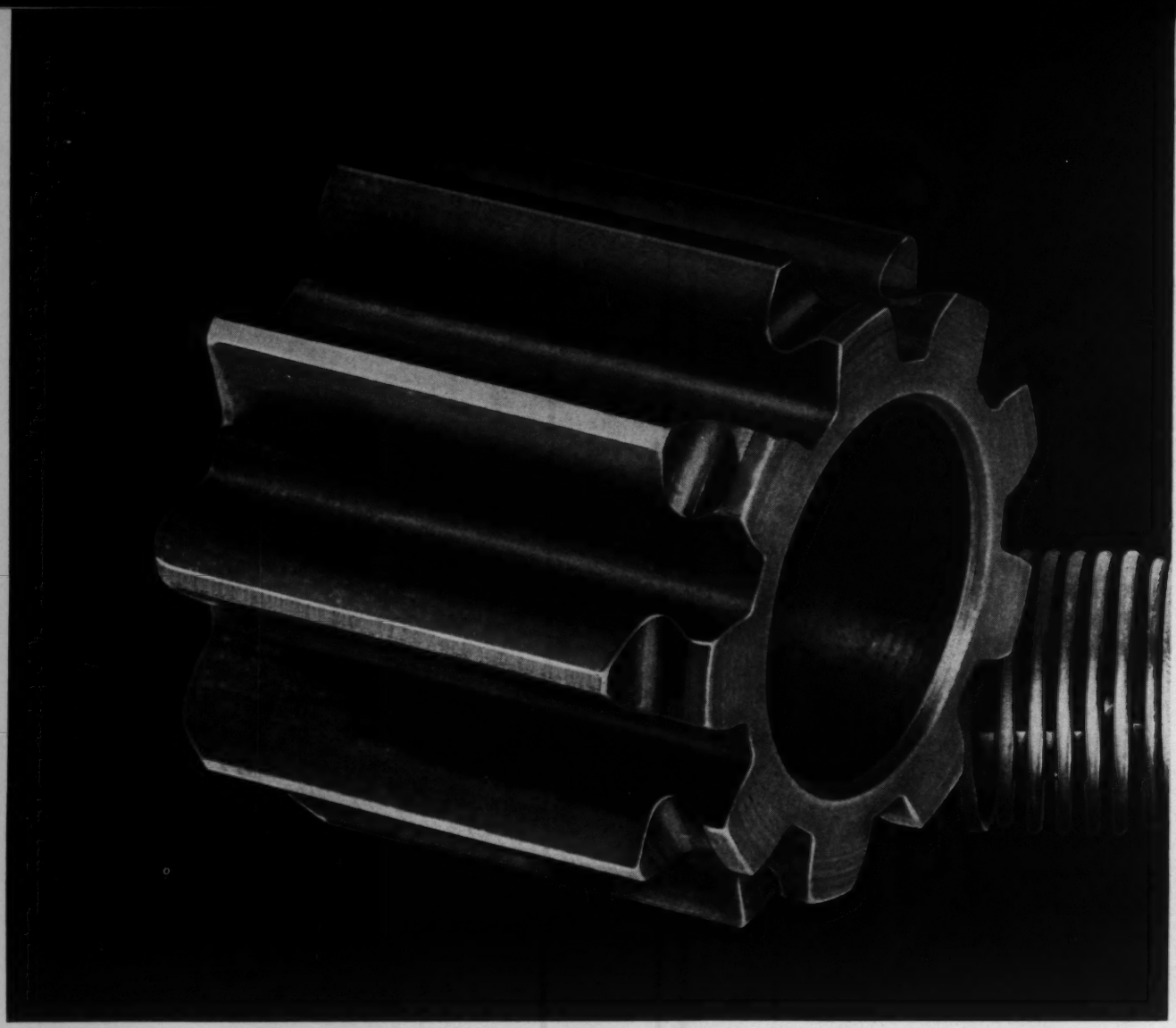
- Greatly reduced down time
- Higher speeds
- Improved finishes—fewer rejects
- Longer useful life of coolants
- Life of edge tools extended
- More sustained tolerances
- Fewer stoppages, adjustments
- Scrap loss considerably reduced
- Elimination of motor pumps
- Curtails bacteria and rancidity
- Saves 25 to 50% in grinding wheels, honing stones, broaches, individual machine tools.

To check on the unlimited industrial applications of individual tool and complete central filtration systems, send for free bulletins and case histories on equipment described above.

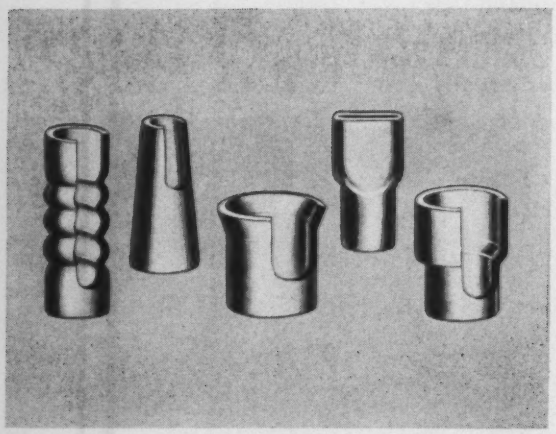
Please write:
U.S. Hoffman Machinery Corp.
Dept. LR, Industrial Filtration Div.
Thompson Road—Plant #1
Syracuse, New York



View of a central pressure filter system at the Plymouth Mound Road Engine Plant of the Chrysler Corp. This system serves a wet grinding department.



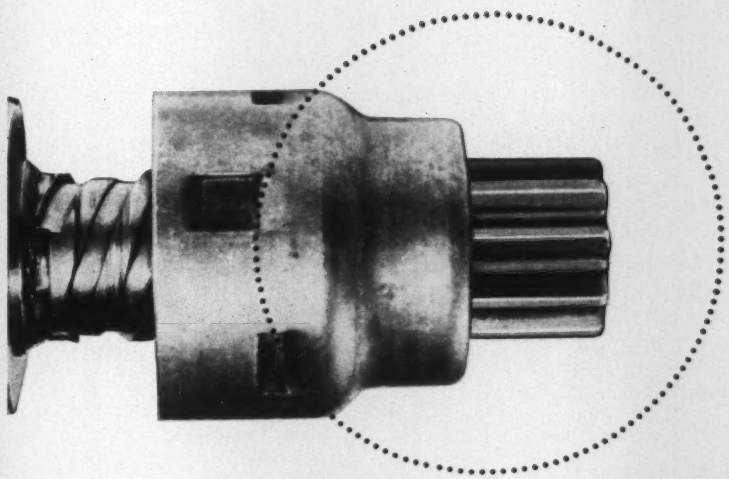
ONE-PIECE SHAPES REPLACE COSTLY ASSEMBLIES when Republic Cold Drawn Special Section Bars formed to the predominating cross section of the part are used. Completed parts are stronger, longer wearing, and cost less. Republic Special Sections simplify built-up, interlocking, or associated parts . . . are available in carbon, alloy, and stainless steels.



SIMPLIFIED TUBULAR PARTS PRODUCTION results from use of Republic ELECTRUNITE® Mechanical Tubing. With uniform wall thickness, concentricity, strength, and ductility, ELECTRUNITE Round Mechanical Tubing is easily flanged, swaged, flattened, spun, fluted, configured, rolled, upset, and otherwise changed in cross section. Mail coupon.

SOLVING THE PROBLEM

Alloy steel starter drive pinion withstands severe torque, impact, wear

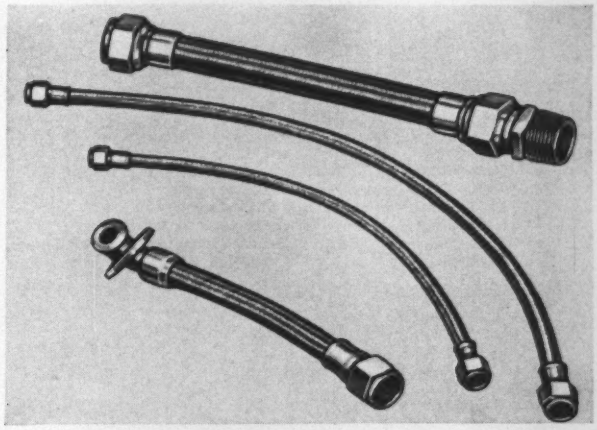


One of the largest manufacturers of automobile starter drives specifies Republic Cold Drawn Alloy Steel Bars for their most critical component—the drive pinion.

Following delivery, the cold finished alloy bars are blanked, hobbed, chamfered, and drilled. Teeth are cut on a gear hobber, then pointed for easy meshing with the flywheel.

Use of Republic Alloy Steel provides the necessary strength and toughness to withstand torque, impact, and prolonged wear. In addition, the cold drawn alloy used provides better machinability at reasonable cost.

Republic field metallurgists will work closely with your metallurgists and engineers. 3-Dimensional Metallurgical Teams, comprised of field, mill, and laboratory metallurgists, will help you select, apply, and process the right alloy steel for any application. Write today or mail the coupon for complete information—without obligation—on this confidential service.



HIGH PRESSURE FITTINGS—sockets, nipples, flanges, elbows, and swivel nuts—to handle missile and aircraft fuels are produced by Resistoflex Corporation, Roseland, New Jersey. Fittings are machined from 3/8" and 2" diameter Republic Stainless Steel Bars to assure maximum strength, corrosion-resistance, and machinability.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. IA-8187-A
1441 REPUBLIC BUILDING · CLEVELAND 1, OHIO

Send more information on:

- ☐ Cold Finished Stainless Steel Bars
- ☐ Cold Finished Alloy Steel Bars ☐ Special Bar Sections
- ☐ 3-Dimensional Metallurgical Teams
- ☐ ELECTRUNITE Mechanical Tubing

Name_____ Title_____

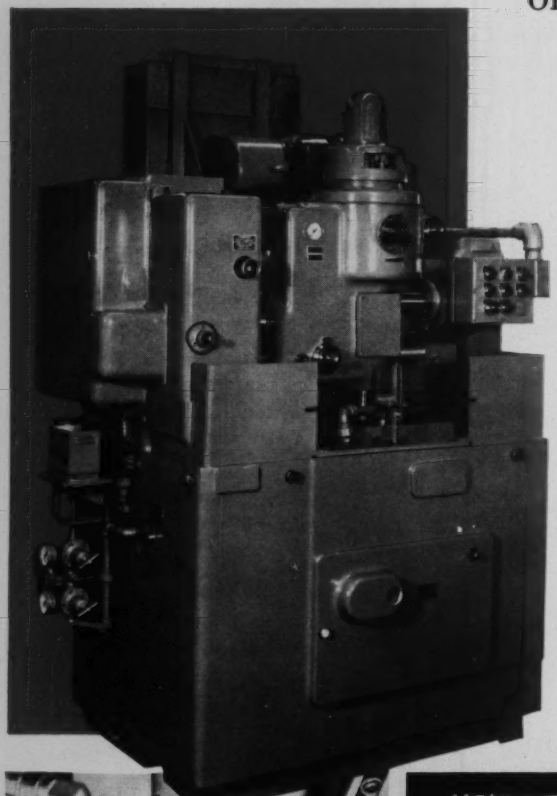
Company_____

Address_____

City_____ Zone____ State_____

AUTOMATIC WORK HANDLING

Is A Natural Complement to the High Production Rates of the Fellows 4GS Gear Shaper

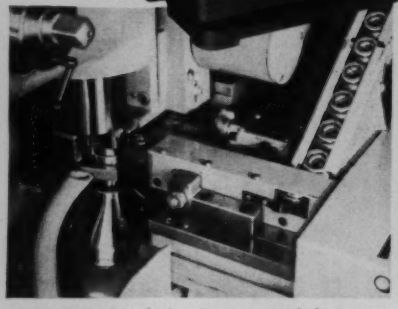


Although designed for both manual and automatic loading, the 4GS Fellows Gear Shaper makes best use of its high production rates when equipped with work handling devices.

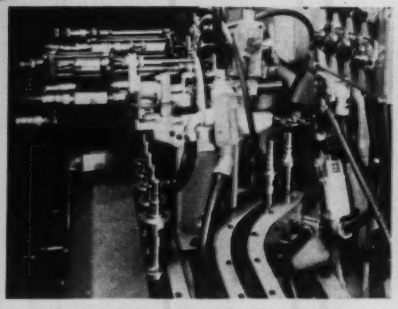
The physical construction of the machine is such that it may be easily adapted for use with magazines and chutes for automatic loading and unloading at substantial cost savings on continuous production runs.

Ask your Fellows representative about the many advantages of automatic work handling with the 4GS Fellows Gear Shaper, or write direct to the Fellows Gear Shaper Company.

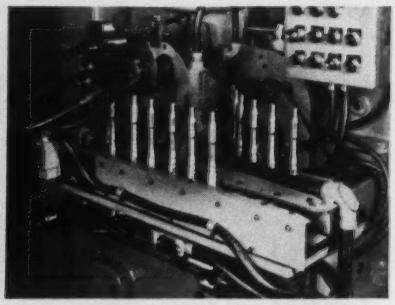
THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont, U. S. A.
Branch Offices:
1048 North Woodward Ave., Royal Oak, Mich.
150 West Pleasant Ave., Maywood, N. J.
5835 West North Avenue, Chicago 39
6214 West Manchester Ave., Los Angeles 45



These internal clutch parts are fed automatically from a vibratory feeder down a chute to the magazine slide from which they are located and clamped. The cutter spindle is automatically stopped at the top of its stroke for clearance during the loading and unloading cycle. Cutting time is 1½ minutes. *Gear Data:* 10 Teeth, 12.4 Pitch (Stubbed), 30° Pressure Angle, Spur, 5/32″ Face Width.

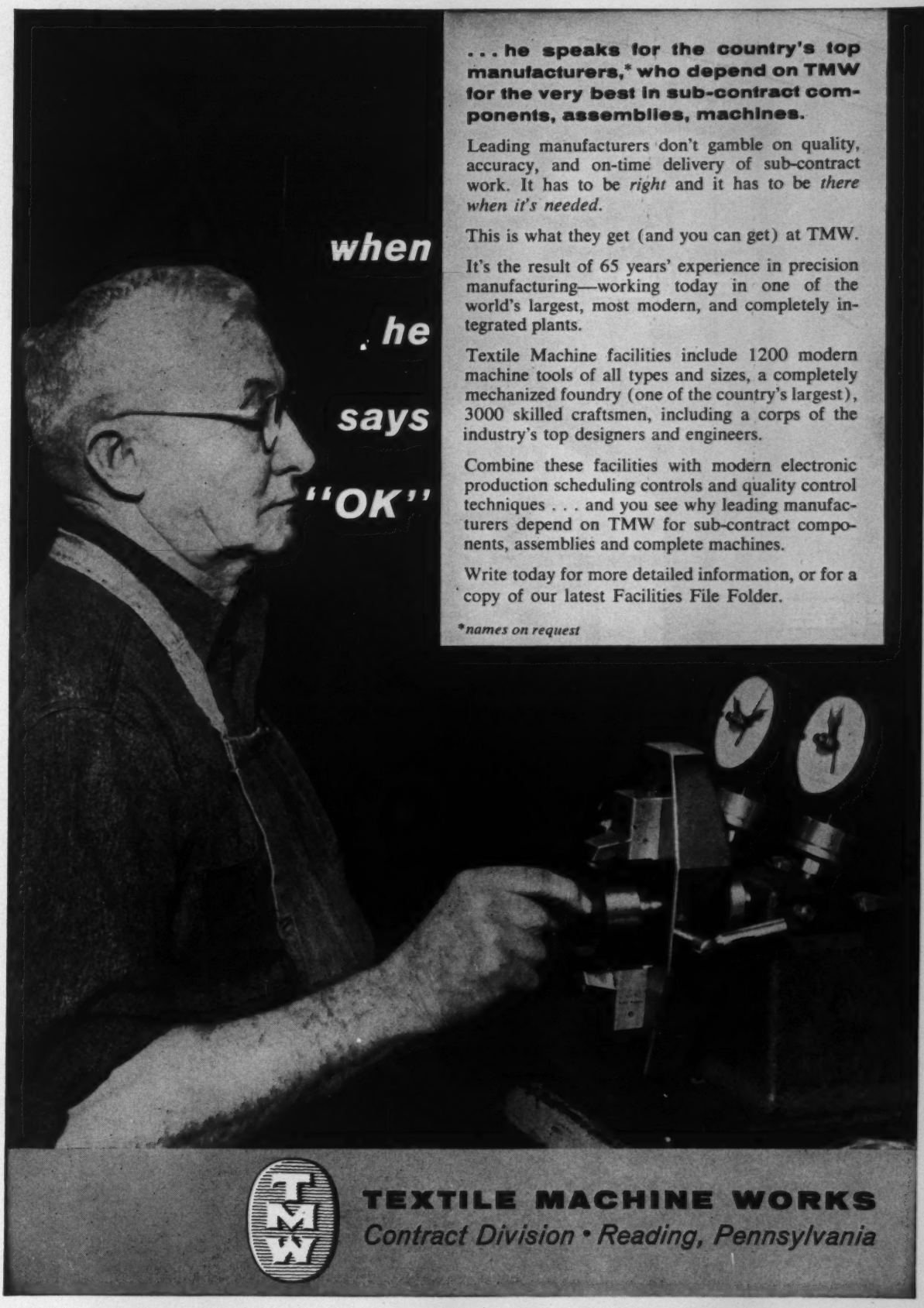


This transmission cluster gear shaft is handled by two sets of air-operated "fingers" mounted on a turret. As the turret rotates, one set of fingers moves the finished piece to the unloading chute while the other set brings the new blank into position. Cutting time is 35 seconds. *Gear Data:* 10 Teeth, 12.4 Pitch (Stubbed), 30° Pressure Angle, External Spur, 5/32″ Face Width.



This automotive stem pinion is handled in the same manner as the cluster gear. In both cases, safety devices prevent the machine from starting unless the blanks are in the correct cutting position. Loading and unloading chutes may be hand or conveyor fed. Cutting time is 2½ minutes. *Gear Data:* 17 Teeth, 10 Pitch, 19° 30′ Pressure Angle, 32° 51′ Helix Angle, 5/8″ Face Width.

THE PRECISION LINE *Fellows* *Gear Production Equipment*



. . . he speaks for the country's top manufacturers,* who depend on TMW for the very best in sub-contract components, assemblies, machines.

Leading manufacturers don't gamble on quality, accuracy, and on-time delivery of sub-contract work. It has to be *right* and it has to be *there when it's needed.*

This is what they get (and you can get) at TMW.

It's the result of 65 years' experience in precision manufacturing—working today in one of the world's largest, most modern, and completely integrated plants.

Textile Machine facilities include 1200 modern machine tools of all types and sizes, a completely mechanized foundry (one of the country's largest), 3000 skilled craftsmen, including a corps of the industry's top designers and engineers.

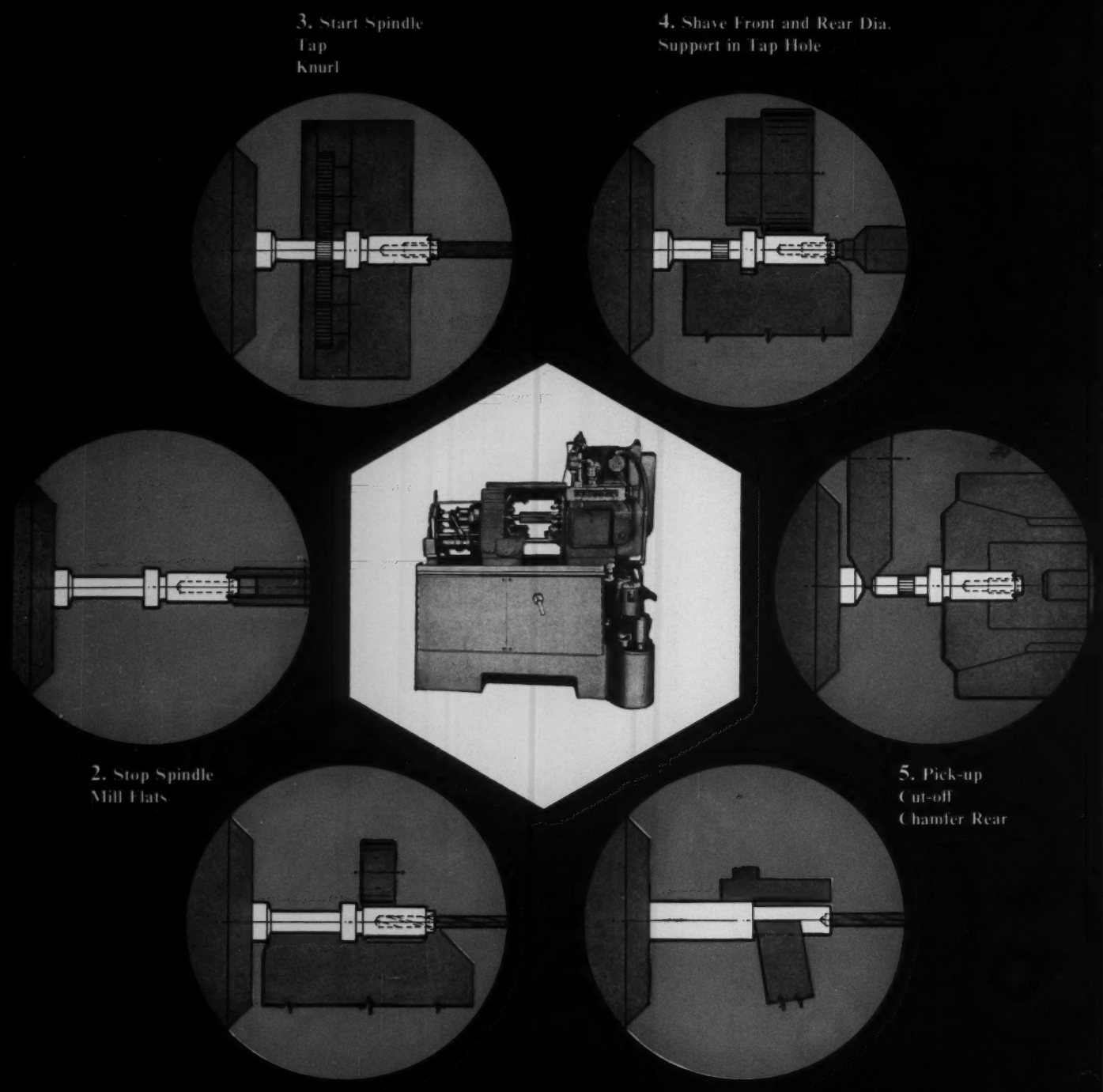
Combine these facilities with modern electronic production scheduling controls and quality control techniques . . . and you see why leading manufacturers depend on TMW for sub-contract components, assemblies and complete machines.

Write today for more detailed information, or for a copy of our latest Facilities File Folder.

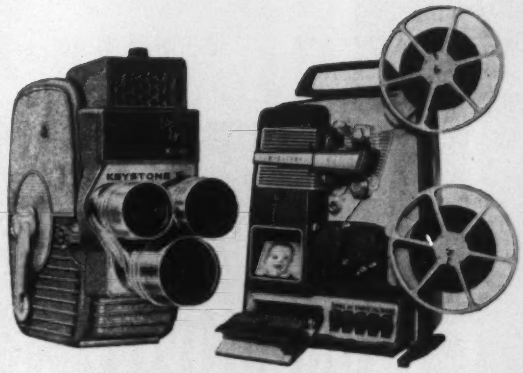
**names on request*

TEXTILE MACHINE WORKS

Contract Division • Reading, Pennsylvania



9 operations in 3.8 seconds . . . one of the typical parts produced by Keystone Mfg. Co. on the 7/16" RA-6 Bar Automatic



85,000 Pieces Per Day And No Rejects

Production *facts* tell a typically impressive story of Acme-Gridley machining efficiency at Keystone Manufacturing Company, Boston, Mass.

"We have five 7/16" RA-6 Spindle Bar Automatics", states a Keystone executive. "Everyday, they produce an average of 85,000 precision parts for our cameras and projectors . . . and yet, there are literally no rejects. As a result of this consistent conformance to our tough tolerances, scrap losses have been wiped out and inspection time reduced to an all time low. What's more, because Acme-Gridleys produce in a single set-up jobs otherwise requiring secondary machining, we've cut production costs."

Dramatic and *tangible* savings like those realized by Keystone are commonplace with Acme-Gridleys. Such features as a wide open tooling zone, direct camming and independently operated tool slides can help you achieve higher mass production efficiency at lower cost. We'll be happy to supply complete information on the world's most complete line of multiple and single-spindle automatic bar and chucking machines. Call, write or wire.

National Acme's "Zone of Responsibility" includes all phases of cost reduction

Check YOURS . . . Then Check National Acme

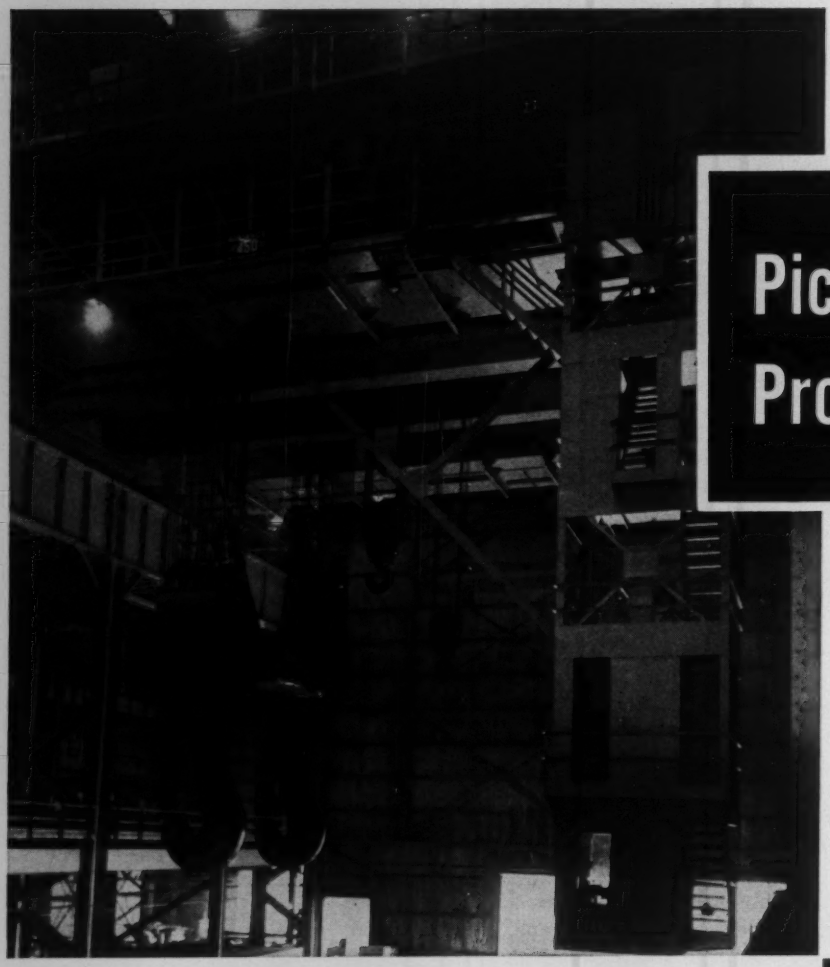
Direct Costs: these include direct dollar savings as realized by Keystone Manufacturing Co. . . . an "everyday" job for Acme-Gridleys. **Indirect Costs:** effecting important savings in maintenance, downtime, scrap reduction, tool costs, etc. **Product Redesign:** teaming with your design group to take full advantage of Acme-Gridleys' cost reducing capabilities. **Direct Material Costs:** our engineers provide important savings in this area by constantly matching machines and tools to modern metallurgical problems. **Make-or-Buy Reviews:** in many cases our Contract Division can assume your production headaches and relieve you of immediate capital investment. **Spot Modernization:** pioneering in modern tooling methods, and the flexibility of Acme-Gridleys can provide many "on-the-spot" savings.

National Acme

The National Acme Company
175 E. 131st Street
Cleveland 8, Ohio

Sales Offices: Newark 2, N.J.; Chicago 6, Ill.; Detroit 27, Mich.

MMT=PE



Pick-up for Productivity...

Install
WAGNER *POWERED*
hydraulic brakes on busy cranes

Are shuddering, crane-wrenching stops . . . skid-by-the-spot stops . . . premature stops . . . reducing the productivity of your operation? Put an end to them. Equip your busy cranes with Wagner *Powered* Hydraulic Crane Bridge Brakes.

Wagner *Powered* Braking Systems reduce wear on equipment. Smooth power operation ends bridge motor plugging with its resultant damage to both motors and gears. Brakes don't drag and unnecessarily wear wheels and linings. You get safer, more efficient crane operation. Operators can stop cranes consistently and smoothly . . . productivity is increased, particularly in operations where frequent starts and stops are necessary, where close spotting is required, where heavy equipment is involved.

Your operators perform more efficiently, too, because there's far less fatigue. They can stop cranes with an easy touch of toe on a button while the heel rests comfortably on the floor. Several brakes can be operated from one station.

These power units can be added to your present Wagner Hydraulic System. Let your nearby Wagner Industrial Brake Application Engineer show you how easy, fast and economical such an installation can be. There are Wagner branches in 32 principal cities.

Wagner Electric Corporation
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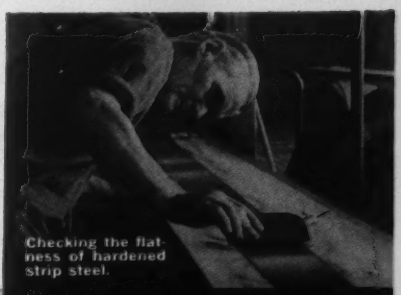
SERVING 2 GREAT GROWTH INDUSTRIES—*ELECTRICAL • AUTOMOTIVE*

Careful And Costly Control Grooms

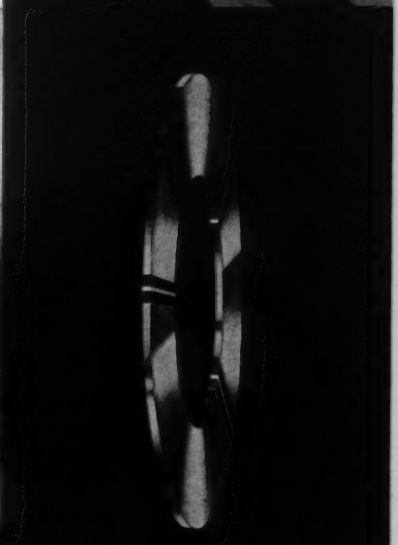
SANDVIK SPRING STEELS

FOR SPECIAL PERFORMANCE

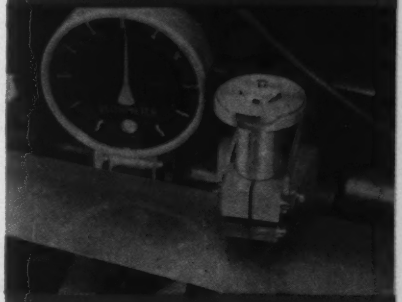
Smoothness of strip surface is checked with a "Talysurf" surface measuring instrument which registers the profile depth magnified up to 50,000 times.



Checking the flatness of hardened strip steel.



Sandvik laboratories carry out over 200,000 chemical analyses a year.



Strip thickness is checked during rolling and at final inspection with a "Deltameter"

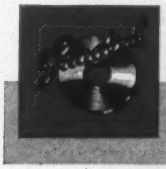
Sandvik spends extra time, money and effort to produce spring steels with the quality to meet difficult performance demands.

From the ore in Sandvik's mines to the finished strip, Sandvik applies constant, rigid quality control to every steel-making step. Special analyses, careful, small-lot processing, modern laboratories equipped with special scientific instruments . . . these are behind Sandvik's record of success in tough spring steel applications.

For special physical properties plus accurate and uniform flatness, straightness, width, gauge and edge finish, specify Sandvik. Wide variety of qualities and sizes in stock plus local Sandvik facilities for custom-processing and finishing to your requirements. Send for free brochure.

SANDVIK STEEL, INC.

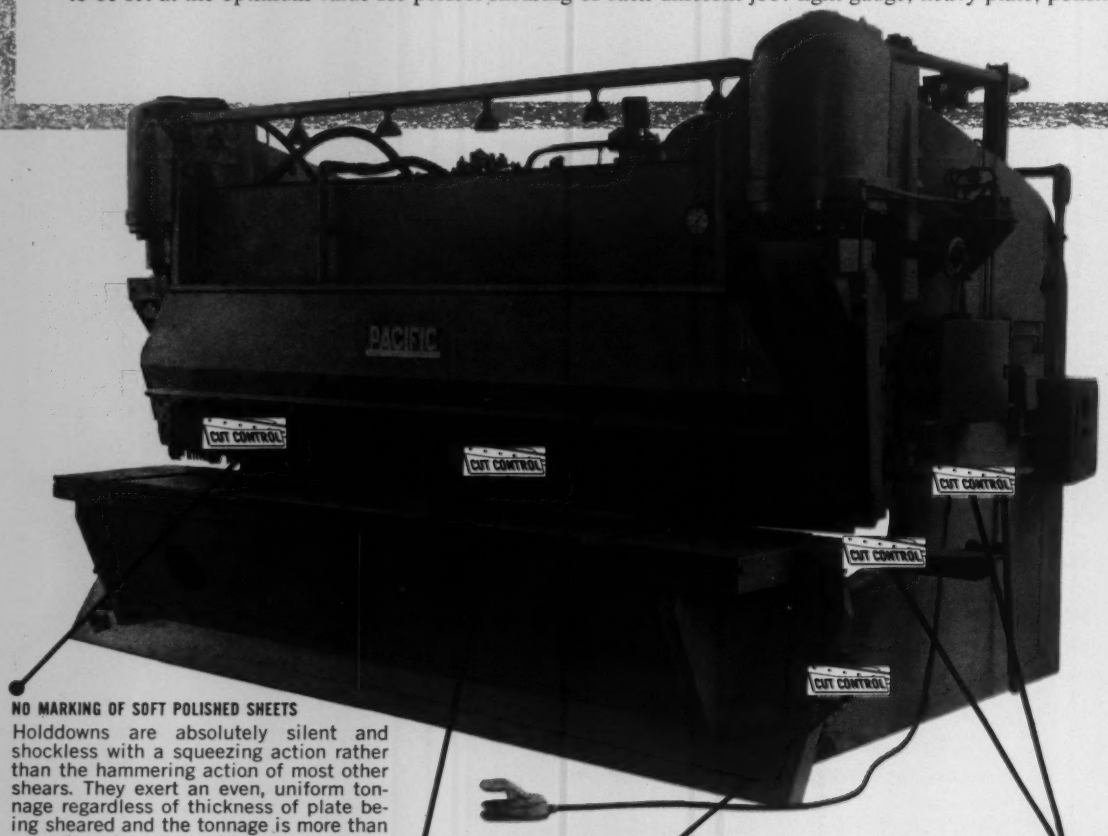
1702 Nevins Road, Fair Lawn, N. J.
Tel. SWarthmore 7-6200 • In N. Y. C. Algonquin 5-2200
***Branch Offices:* Cleveland • Detroit • Chicago • Los Angeles**
SANDVIK CANADIAN LTD. P.O. Drawer 1335, Sta. O. Montreal 9, P. Q.
***Works:* Sandviken, Sweden**



SS-203

CUT CONTROL adjustments to do jobs that

Unlike conventional shears that are limited in their shearing ability because they are permanently set without possible adjustment, PACIFIC features *Cut Control*—a group of adjustments which permit all controls to be set at the optimum value for perfect shearing of each different job: light gauge, heavy plate, polished



NO MARKING OF SOFT POLISHED SHEETS

Holddowns are absolutely silent and shockless with a squeezing action rather than the hammering action of most other shears. They exert an even, uniform tonnage regardless of thickness of plate being sheared and the tonnage is more than any other shear.

"INSURED" POSITIONING OF PLATES

For precision shearing, holddowns advance and positively grip plate independently of upper knife movement allowing operator to check for exact alignment (with aid of cut illumination) before shearing. All cuts are good cuts with PACIFIC.

LIGHT GAUGE SHEARING WITH HEAVY PLATE SHEAR

Knife clearance can quickly be adjusted over twice the range of any other shear so that PACIFIC can quickly be changed to cut either light gauge or heavy plate.

READILY SET UP FOR SLITTING

Depth of stroke readily adjusted so knives do not completely cross in slitting. This permits plates to be lined up with slitting attachment. Deep throats permit wide strips to be slit.

"CUSHIONED" SHEARING OF BRITTLE ALLOYS—Hydraulic power exerts smooth uniform shearing force cushioned against initial cutting shock and break-through shock. Rake angle readily adjusted for optimum setting to minimize or eliminate shock • HEAVIEST DUTY SHEAR—PACIFIC is designed for heavy duty continuous mill type service. It has more holddown tonnage, more horsepower and more weight in the actual stress bearing frame than any other shear. Customers report cutting full capacity stainless steel regularly • SAFEST SHEAR—Hydraulic system completely protected against deliberate or accidental overload. Shearing action can be stopped instantly in emergency by operator releasing foot pedal • LONGEST KNIFE LIFE—Customers report from 3 to 8 times longer knife life than mechanical shears. Knives cushioned against

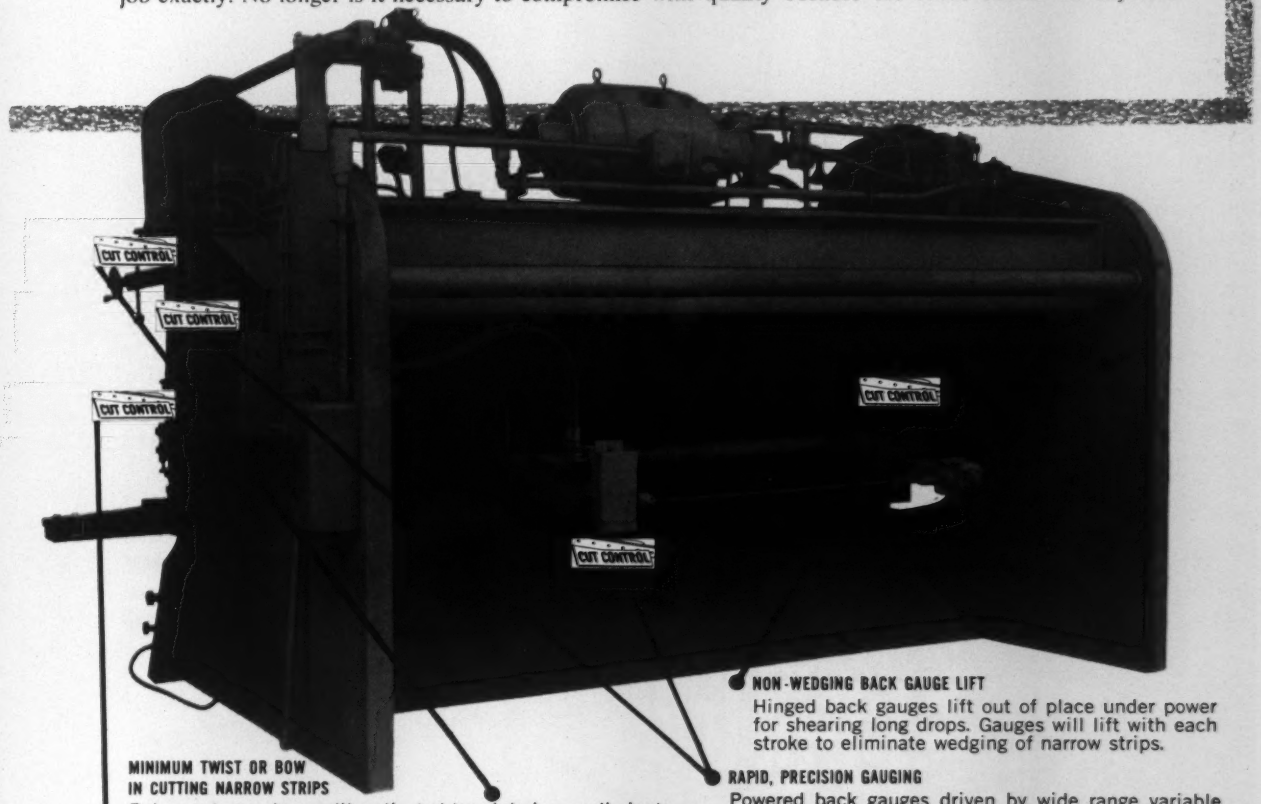
Write for brochure

PACIFIC INDUSTRIAL MANUFACTURING COMPANY

848 49th AVE., OAKLAND, CALIF. • PLANTS: OAKLAND, CALIF. and MT. CARMEL, ILL.

enable PACIFIC Hydraulic Shear are impossible on any other shear

stainless, soft aluminum, brittle alloys, long narrow strips, high speed cycling for high production, extreme accuracy for precision work, perfect mark-free edges. For the first time a shear can be controlled to fit the job exactly. No longer is it necessary to compromise with quality because the shear cannot be adjusted.



NON-WEDGING BACK GAUGE LIFT

Hinged back gauges lift out of place under power for shearing long drops. Gauges will lift with each stroke to eliminate wedging of narrow strips.

RAPID, PRECISION GAUGING

Powered back gauges driven by wide range variable speed hydraulic motor for rapid positioning with smooth deceleration to precise inching speed. Anti-friction ball screws; heavy single gauging bar; powered gauges controlled and indicated from front of shear.

MINIMUM TWIST OR BOW IN CUTTING NARROW STRIPS

Rake angle can be readily adjusted to minimize or eliminate twist and bow in light materials. Even full capacity plate can be sheared at less rake angle than on other shears.

HIGH CYCLING SPEED FOR HIGH PRODUCTION

PACIFIC has been designed to cycle as fast as an operator can feed it. Lineal speed of the ram has been selected at the optimum speed for maximum knife life and safety. Cycling speed is attained by shortening the stroke to the minimum permissible for each job thereby eliminating all wasted motion. In light gauge shearing of full length pieces, rake angle may also be reduced to further shorten the required stroke. In shearing small pieces or sheets that are less than the full length of the shear, the stroke can be shortened to the length of the sheet so that the upper knife returns upward immediately after completing the cut. Light strips can be sheared at rates up to 70 strokes per minute.

shock, protected against overload, uniform shearing speed through cut • NOISELESS OPERATION, QUIETER THAN A SEWING MACHINE—By completely eliminating usual loud, shattering noise through cushioned shockless shearing, PACIFIC has promoted measurable increase in efficiency of plant and office workers. No interference with adjacent electronic burning and gauging equipment • LOWEST MAINTENANCE—No wearing parts such as clutches, gears, bearings, brakes. All moving parts run in filtered oil. Only maintenance items are a few standard solenoids, relays, microswitches and yearly oil changes • HUNDREDS OF DOLLARS OF SAVINGS IN FOUNDATION COST—Foundation required to resist only dead weight and insure proper line-up. It need not resist heavy shocks, hammering and twisting of mechanical shear.

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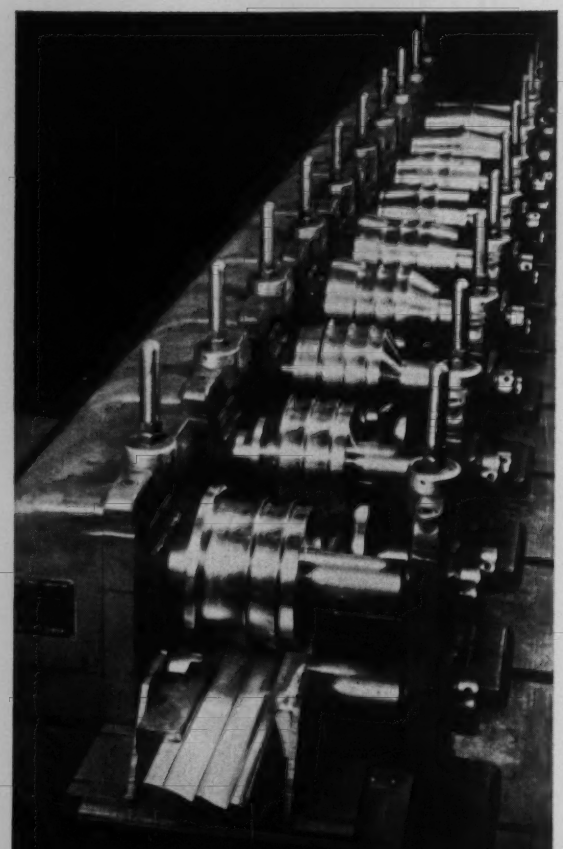
ALBUQUERQUE, N. M.; DENVER, COLO.—R. E. Dubac Associates • ARIZONA; LOS ANGELES AND BURLINGAME, CALIF.; NEVADA—Tornquist Machinery Company • ATLANTA, GA.—J. R. Carlson Machinery Company • CHICAGO, ILL.—L. G. Evans & Company • CLEVELAND, OHIO—T. R. Wigglesworth Machinery Dist. • DAVENPORT and DES MOINES, IOWA; KANSAS CITY and ST. LOUIS, MO.; OKLAHOMA—Moehlenpah Engr. Inc. • DETROIT, MICH.—Taylor Thompson Machinery Company • DALLAS, TEXAS—Machine Tool Associates • HOUSTON, TEXAS—Butcher-Carter-Preston • INDIANAPOLIS, IND.; LOUISVILLE, KY.—H. B. Green Mch. Co. • MOUNT VERNON, N. Y.—Wm. Halpern & Co. • MILWAUKEE, WIS.; MINNEAPOLIS, MINN.—Gute Company • NORFOLK, VA.; KNOXVILLE, TENN.—Tidewater Supply Co. • NEW ORLEANS, LA.—Dixie Mill Supply Co. • PITTSBURGH, PA.—Howard Canning • PORTLAND, ORE.—Portland Machinery Company • ROCHESTER, N. Y.—Ogden R. Adams Co., Inc. • SALT LAKE CITY, UTAH—Todd Machinery Company • SEATTLE, WASH.—Buckner Weatherby Company • WASHINGTON, D. C.; WYNNEWOOD, PA.; MARYLAND; DELAWARE—Edward A. Lynch Machinery Co. • WETHERSFIELD, CONN.—Beisel Machinery Company • ORLANDO, FLA.—J. R. Carlson Machinery Company • TORONTO, ONT.; CANADA—Hercules Presses Ltd.

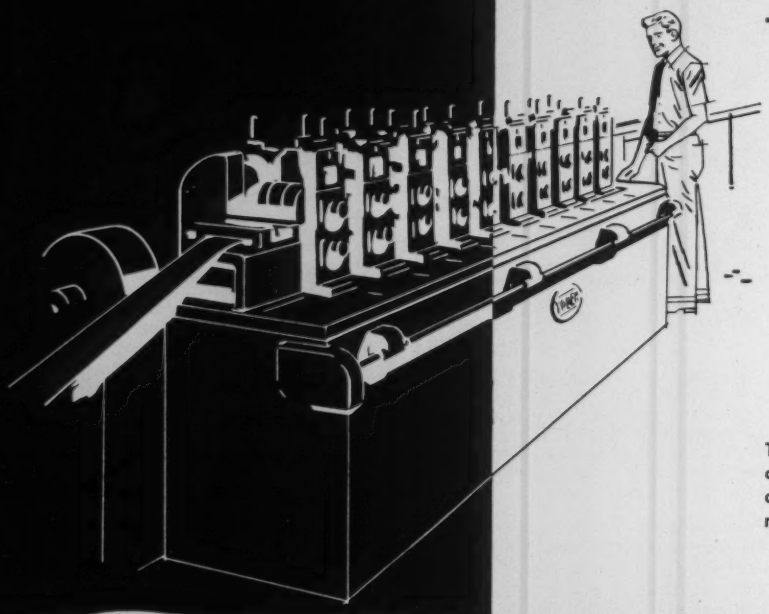


Yoder Roll-Forming Equipment mass-produces shapes accurately, economically

Yoder Roll-Forming Equipment, even with part-time operation, can effect significant savings in many metal working applications and industries. Shapes, simple or complex, can be quickly and economically produced the Yoder way from a wide variety of flat-rolled coated or uncoated stock . . . in thickness up to ¾ inch . . . in speeds up to 50,000 feet per day.

Yoder engineers flexibility and precision into metal forming operations. For example: many basic shape modifications, such as coiling, welding, notching, ring-forming, perforating, and cutting to length can be simultaneously accomplished with little or no additional labor cost.

Yoder also makes a complete line of Rotary Slitters and Pipe and Tube Mills. Profit from Yoder's years of engineering and service experience, contact your local Yoder representative or send for the Yoder Roll-Forming Manual.

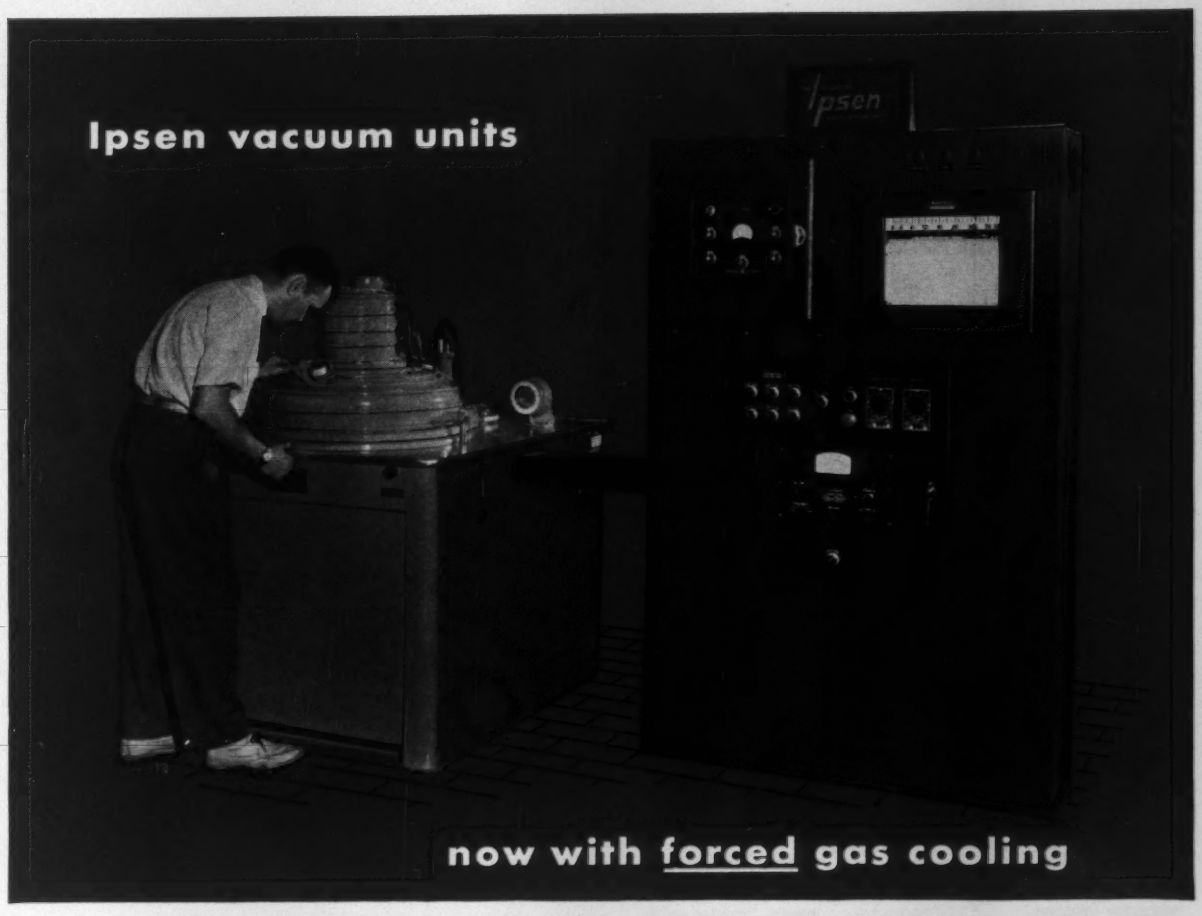


THE YODER COMPANY
5510 Walworth Avenue
Cleveland 1, Ohio

This fully-illustrated 88-page book clearly discusses every important aspect of Yoder Roll-Forming Equipment and methods . . . it's yours for the asking!

ENGINEERING
YODER
MANUFACTURING

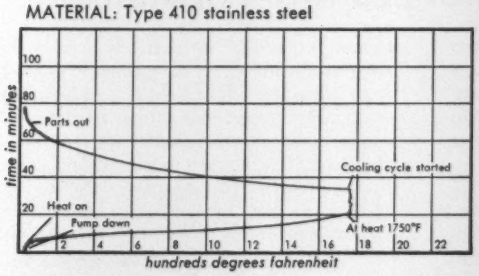
COLD ROLL FORMING MACHINES
PIPE AND TUBE MILLS (ferrous or non-ferrous)
ROTARY SLITTING LINES



Ipsen vacuum units with *fast gas cooling* now offer a safe and economical method for bright hardening and annealing of stainless steels, high-speed steels, tool steels, and high temperature alloys; also, sintering and brazing of high temperature alloys!

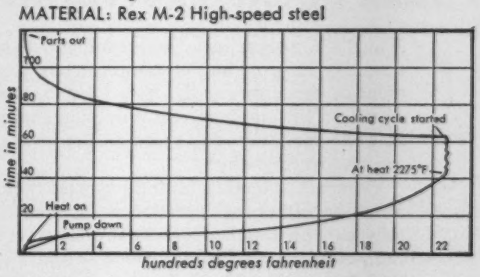
Here are typical examples of performance by the VVFC-1014-E furnace pictured above:

PARTS: Aircraft quality screw fasteners
MATERIAL: Type 410 stainless steel



COMPLETE TIME CYCLE: 1 hour 8 min.
RESULTS: Rockwell C 42-43
APPEARANCE: Exceptionally bright

PARTS: Boring bars
MATERIAL: Rex M-2 High-speed steel



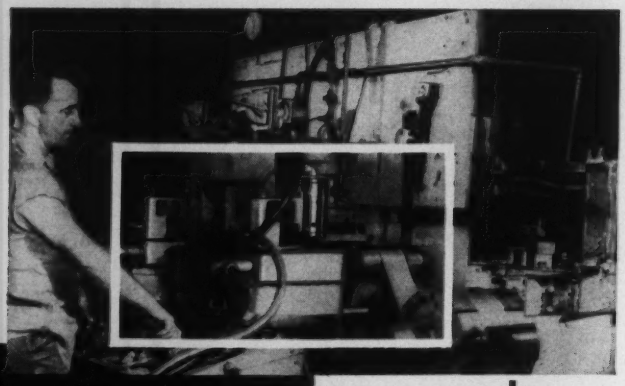
COMPLETE TIME CYCLE: 2 hours 10 min.
RESULTS: Rockwell C 64-66
APPEARANCE: Exceptionally bright

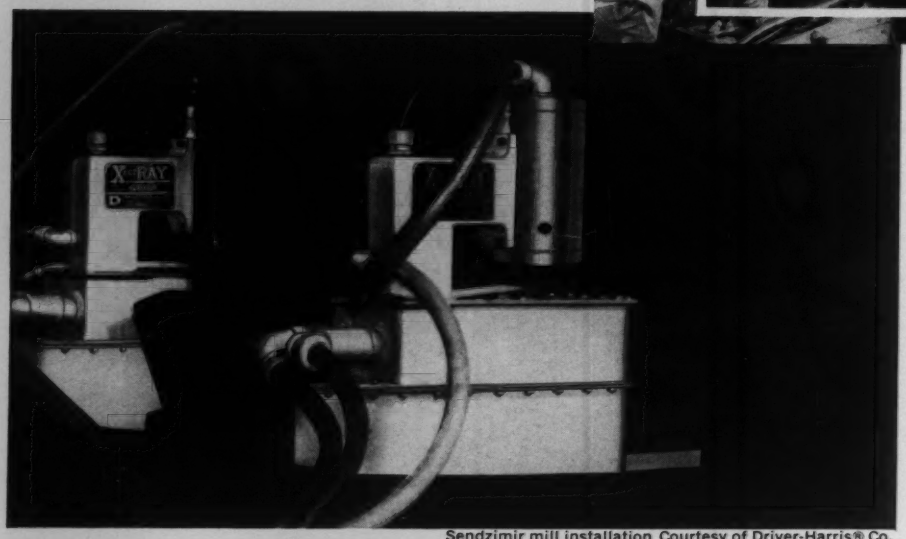
A complete line of standard vacuum units is available. Also, vacuum facilities are available in which processing, testing, and analysis can be made to recommend the proper equipment for your parts. For detailed information contact Ipsen Industries, Inc.

AUTOMATIC Ipsen HEAT TREATING UNITS

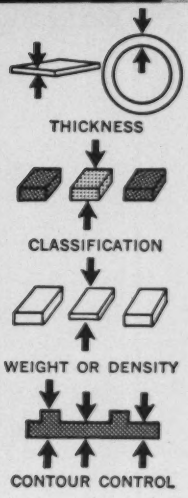
IPSEN INDUSTRIES, INC. • 725 SOUTH MAIN STREET • ROCKFORD, ILLINOIS

keep an x-ray "eye" on your metal-rolling costs . . .





Sendzimir mill installation Courtesy of Driver-Harris® Co.



XactRAY NON-CONTACT THICKNESS GAUGES

BOOST YEAR-ROUND PROFITS WITH SPEED AND PRECISION

XactRAY gauges have long been noted for their accuracy in providing absolute thickness measurement of metal on-the-fly. Now they're winning recognition for another great operating characteristic as well—economy—and more and more metal men are discovering why!

Compact and efficient, these gauges require little attention, either for operation or maintenance. And they can be installed practically anywhere in the mill, even close to hot equipment, without upsetting the process line. Mountings are custom built to fit particular requirements.

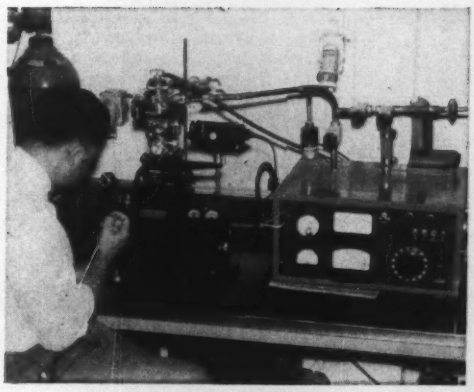
Continuous XactRAY gauging, coupled with automatic controls and/or alarm devices, saves manhours and millhours...gives measurements to tolerances as close as ±.000010" whether the metal is moving at 6 or 6,000 feet per minute. Material can be put "on-gauge" in fractions of seconds, and the response to thickness deviations is faster than with most other non-contact gauges. This leads to further savings through reduced scrap.

Whatever your measurement...foil, plate or sheet ...ferrous or non-ferrous metals and alloys...you'll find XactRAY can contribute to your own dollar savings. Further economies can be effected through the addition of XactRAYMATIC controls.

Write for the latest literature giving full information on the cost-cutting advantages of XactRAY gauges. It's yours for the asking through your local Weston representative...or write to Weston Instruments Division, Daystrom, Inc., Newark 12, N. J. *In Canada: Daystrom Ltd., 840 Caledonia Rd., Toronto 19, Ont. Export: Daystrom Int'l., 100 Empire Street, Newark 12, N.J.*

DAYSTROM, INCORPORATED
WESTON INSTRUMENTS DIVISION
World leader in measurement and control

Cutting back the Thermal Thicket



Solving high-temperature problems through research is part of Haynes Stellite's complete metallurgical services. This metallograph is used to observe metals at 2200 deg. F.

The great strength and high scaling resistance of HAYNES alloys at temperatures of 2000+ deg. F. are providing long service life in the hottest areas of jet engines. Flame holders, flame steps and afterburners are some of the hot spots where the properties of HAYNES high-temperature alloys are helping combat burnout, erosion, and stress in the jet, ramjet, missile, and rocket fields.

There are twelve HAYNES high-temperature alloys to choose from, formulated to handle virtually any heat condition. Among them: HASTELLOY alloy X with remarkable resistance to oxidation up to 2200 deg. F. HAYNES alloy No. 25 that resists stresses, oxidation, and carburization up to 2000 deg. F. And HASTELLOY alloy R-235, outstanding in the 1500 to 1750 deg. F. range. All are readily available.

HAYNES
ALLOYS

HAYNES STELLITE COMPANY

Division of Union Carbide Corporation
Kokomo, Indiana

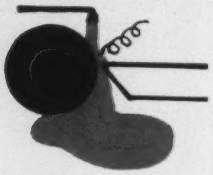
UNION CARBIDE

Address inquiries to Haynes Stellite Company, 420 Lexington Avenue, New York 17, N. Y.

"Haynes," "Hastelloy," and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

. . . THE another

COOLANTS FOR METALWORKING



New chemi-cool HOCUT 237, a brand new concept in non-petroleum coolants, combines important features of many coolants into one economical package: cools, lubricates, prevents rust, stays mint fresh for life. Others: ANTISEP AP Base for heaviest duty and hi-speed cutting; HOUGHTO-GRIND 50 for grinding.

MACHINIST

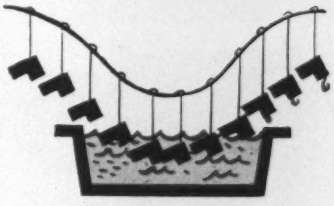
man who knows how much HOUGHTON KNOW-HOW helps!

The Houghton Line includes a full range of new and established products to improve most any metalworking operation. But *making* these products is only half the Houghton story.

More important is Houghton's ability to make them *work for you* . . . job-tailoring each to fit your particular application. *Most* important, Houghton gives you the benefit of 96 years' experience and research in many areas of metalworking to help solve the immediate problem in yours. That's the unique niche Houghton has carved for itself all over the world. And it's one where our leadership has never been challenged.

Near you there's a Houghton Man whose broad metalworking know-how and on-the-job-'til-it's-done service is yours with every item in The Houghton Line. He's a good man to have on your team. Call him or write E. F. Houghton & Co., 303 W. Lehigh Avenue, Philadelphia 33, Pennsylvania.

METAL CLEANERS



Newest in the well-known Houghton Line is the versatile and economical CERFA-KLEEN series . . . four new, more efficient metal cleaners to handle most any cleaning problem. Included are powerful new room temperature cleaners which require no special equipment or added operating costs.

RUST PREVENTIVES

More than 100 varieties for any industry requirement. All are sold under the world-famous COSMOLINE and RUST VETO labels. Included are dry film solvent types, oil solvent types, fingerprint neutralizers, oil and grease types of corrosion preventives, and concentrates for economical plant dilution.

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. . . the most valuable help Houghton can give you. More than 100 Houghton sales engineers are backed by skilled laboratory and field technicians, all experts in their fields. Our 96-year reputation rests on the ability and integrity of these men who are truly your Partners in Production.

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LOOK FOR THE DIAMONDS—SIGN OF FINISHING QUALITY

4 good reasons why you should use IRIDITE®

Chromate Conversion Coatings

ON YOUR ZINC OR CADMIUM PRODUCTS

CORROSION PROTECTION

The wide range of Iridite coatings available gives you a choice of corrosion protection—from economical, mild protection of parts for shipment, storage or display, to extremely high protection under exposure to marine and highly humid atmospheres, gasoline or other hydrocarbons.

PAINT BASE

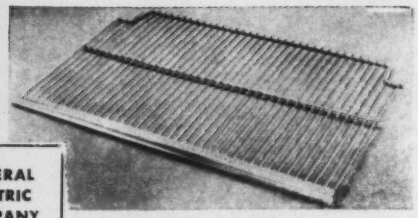
For an extremely tight bond for either baked or air-dried paints, non-porous Iridite blocks moisture penetration—prevents formation of metallic soap products beneath paint coatings.

APPEARANCE

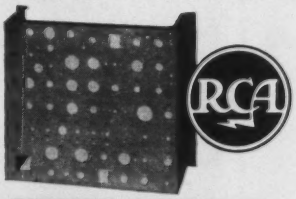
Your choice of colors ranging from clear through yellow iridescent to olive drab. Bright Iridite finishes can also be dyed to provide other color effects.

SPECIAL EFFECTS

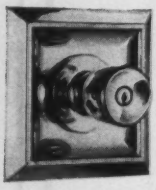
Iridite, in combination with other Allied Research processes, can provide a wide variety of finishes. As an example, Iridite 8-P applied to zinc or cadmium, followed by an application of Irilac, gives a highly attractive simulated brass finish.



GENERAL ELECTRIC COMPANY



RCA



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IRIDITE—a specialized line of chromate conversion coatings for nonferrous metals. Easily applied at room temperatures with short immersion times, manually or with automatic equipment. Forms a thin film which becomes an integral part of the metal. Cannot chip, flake or peel. Special equipment, exhaust systems or highly trained personnel not required.

For complete information on Iridite, contact your Allied Field Engineer. He's listed in the yellow pages under "Plating Supplies." Or, write for FREE TECHNICAL DATA FILES.

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West Coast Licensee for Process Chemicals: L. H. Butcher Co.

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IRIDITE® Chromates | IRILAC® Coatings | ISOBRITE® Brighteners | ARP® Supplies | WAGNER Equipment

For any surface, rough or fine . . . look to Black & Decker's complete Sander line!

FAST FINISHING NO. 88 H.D. SANDER leaves no swirl marks for a satiny surface. Sand with, against or across the grain.

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For heavy-duty material removal or satin smooth surfacing, for a fast finish or dustless performance . . . there's a Black & Decker Sander just made for your job. Belt, disc or orbital design, every Black & Decker Sander is high-powered for standout service to stand up under any work load . . . well-balanced for easy handling, effortless sanding . . . fully protected against abrasive dust and dirt. B&D Disc Sanders double perfectly for grueling grinding jobs, too.

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This is the largest installation of soaking pits ever built at one time. It will heat an average of 750 tons of ingots per hour. At peak capacity, it will fill the ingot buggies at a rate of 1200 tons per hour.

Worldwide engineering and manufacturing facilities through associates in Australia • Belgium • France • Germany • Great Britain • Italy • Japan

■ Forty-eight soaking pits on *one order*. There's a bold act of customer confidence for you! Confidence in the future, for one thing. Confidence in the principle of the Surface one-way fired soaking pit with the jet pump recuperator system. Many other steelmakers have shown similar faith in Surface—a source of pride, matched by our determination to deserve it, ***wherever heat is used in industry***

48 PITS

SURFACE COMBUSTION

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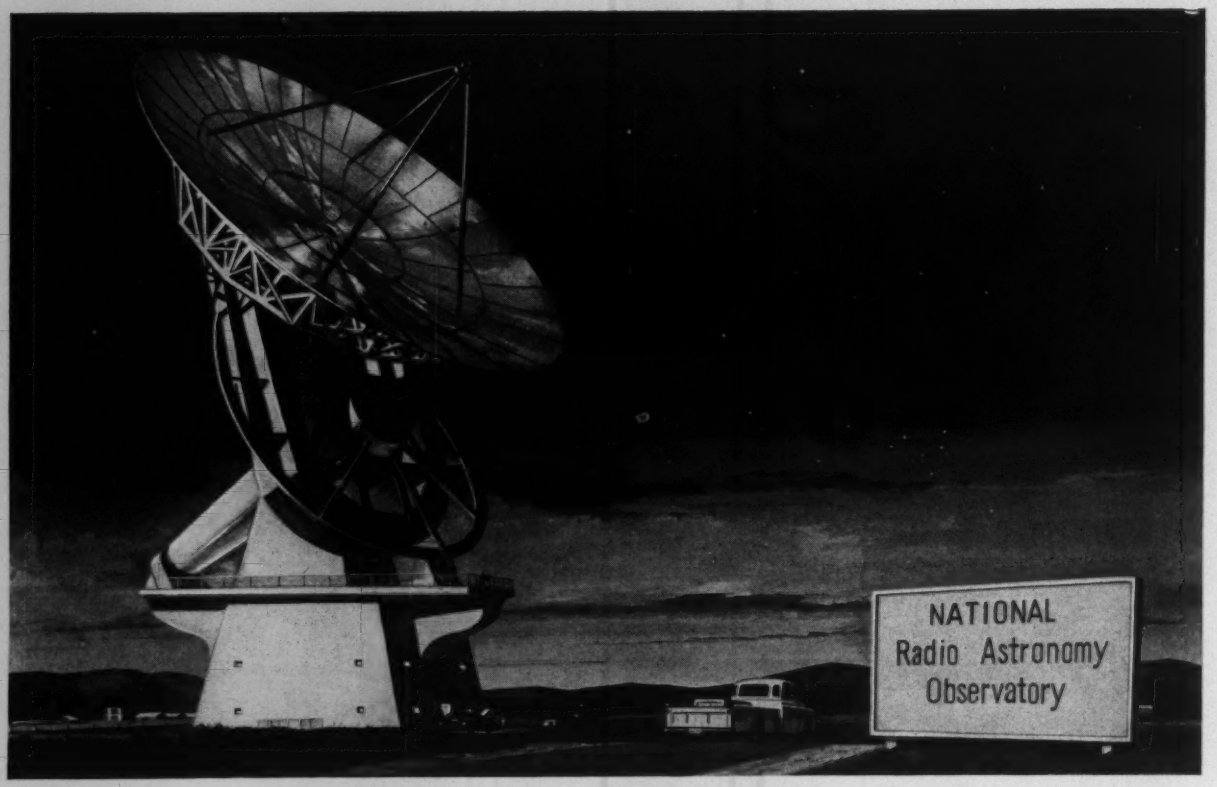
A Division of Midland-Ross Corporation

Surface



This radio telescope is now being constructed by the E. W. Bliss Company of Canton, Ohio, at the National Radio Astronomy Observatory at Green Bank, West Virginia. Nickel-alloyed ductile iron is used for support and control parts to achieve watch-like accuracy in guiding the 5-million-pound instrument. The telescope will be operated by Associated Universities, Inc. for the National Science Foundation.

Eavesdropper at the keyhole of an invisible universe

Objects far out in space that cannot be seen with the most powerful optical telescope can now be studied by astronomers.

They do it with an amazing instrument called the radio telescope which can detect radio waves coming from objects that may be as much as *5 billion light years away!*

It may sound fantastic, but that's exactly what this 140-foot telescope at National Radio Astronomy Observatory will do. And although its moveable parts weigh close to 5 million pounds, watch-like accuracy is being built into every foot, every pound.

Take the cannon-like polar axis shaft, which can be seen pointing skyward in the picture. Sixty-seven feet long and 12 feet across, this shaft will be driven by a gear 85 feet in diameter and a foot thick, with teeth machined to be accurate to within thousandths of an inch.

They'll stay accurate, too. For these parts, as well as the 8 bearing pads supporting the massive assembly, are made of nickel-alloyed ductile iron, a remarkable metal developed by Inco research.

It is Nickel which gives this alloy the extra strength and wear resistance without loss of toughness needed for these parts. Unlike ordinary cast iron, nickel-alloyed ductile iron is not brittle. It can be bent or twisted. It is several times stronger than cast iron, yet easy to cast and machine.

Don't forget nickel-alloyed ductile iron even if you're not thinking of building a radio telescope anytime soon. This versatile metal has hundreds of applications in every industry.

So do Nickel and other Nickel Alloys. Be sure to consider them whenever you need a metal with superior ability to withstand destructive service conditions. And don't hesitate to call on Inco for any technical data or other help you may need. Our booklet, *Engineering Properties and Applications of Ductile Iron,* is typical of the informative material that can be yours for the asking. Write for a copy.

THE INTERNATIONAL NICKEL COMPANY, INC.
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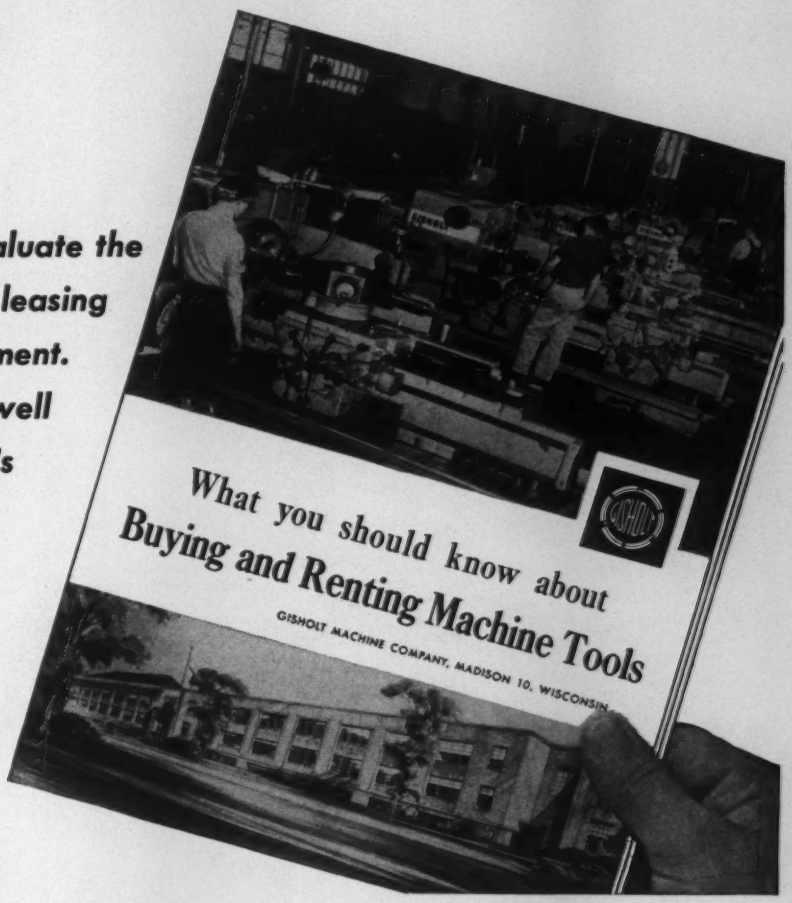
INCO NICKEL

NICKEL MAKES ALLOYS PERFORM BETTER LONGER

Can your competitors turn metal at lower costs?

***Now** is the time to re-evaluate the possibilities offered by leasing of new production equipment. Your decision today can well determine your company's position in tomorrow's competitive market.*



This free booklet tells how you can get new machines with minimum capital outlay

If you have delayed replacing old machines because of the relatively large capital investment, acquisition by methods other than outright purchase may solve your problems. Only a minimum initial investment provides you with the many competitive advantages that new machines offer, including greater accuracy, higher production rates and faster setup. New features and accessories simplify even the toughest jobs. Secondary operations are minimized and spoiled work becomes a thing of the past. All this means lower unit cost—more profit for you.

If you want the benefits that new machine tools can provide, and if you like the idea of letting them "pay their way" while they "turn" a profit for you, you'll want to write for Gisholt Bulletin 1173 on buying and renting machine tools. It fully explains one of the most liberal and comprehensive policies in the industry, and covers several types of leasing and time payment plans with vital information on depreciation, tax angles, the MAPI formula and other timely questions. The coupon will bring your free copy. Send it along today.

GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin

ASK YOUR GISHOLT REPRESENTATIVE ABOUT FACTORY-REBUILT MACHINES WITH NEW-MACHINE GUARANTEE

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Without obligation, please send your Bulletin 1173.

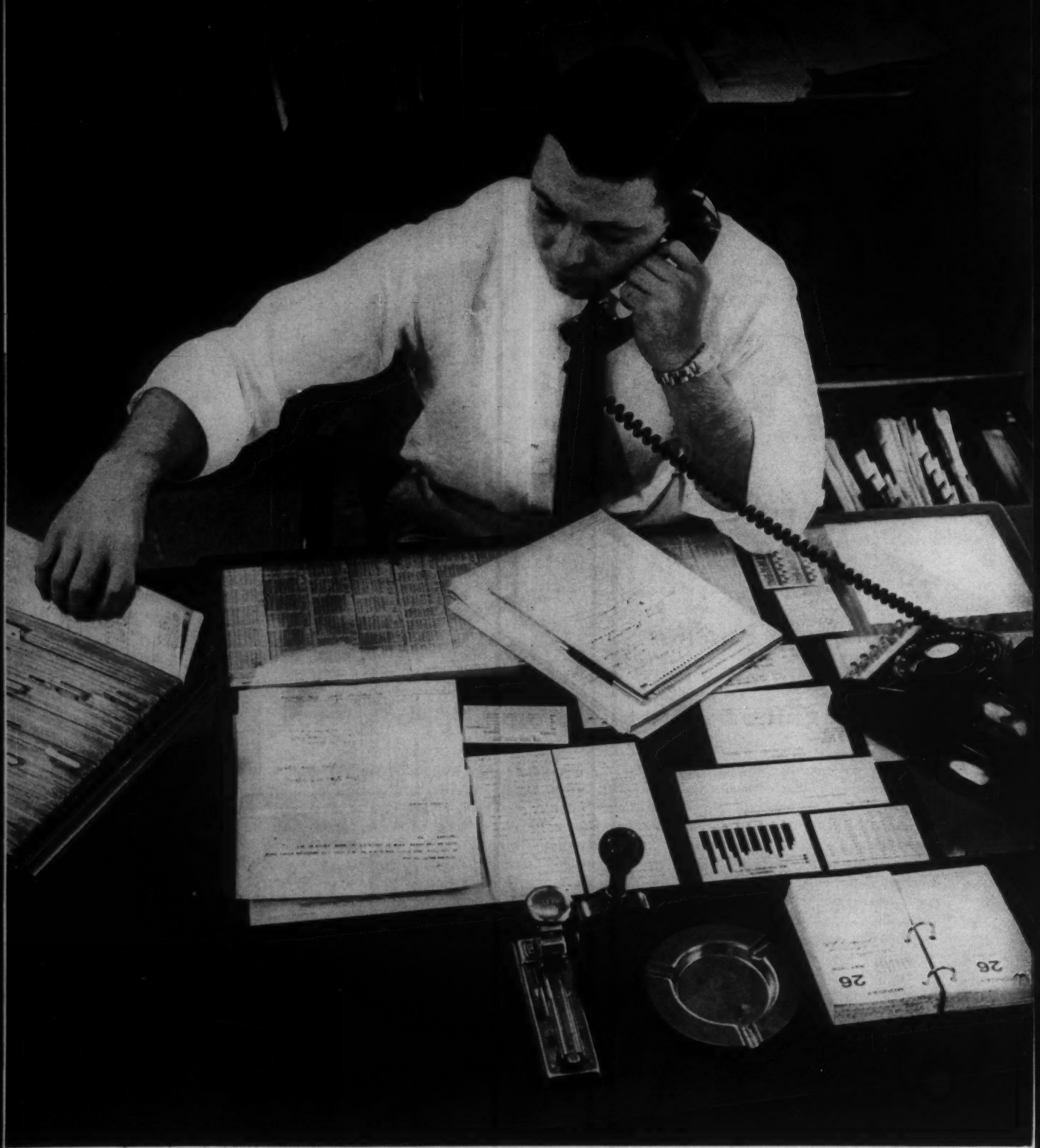
Name.....*Title*.....

Company.....

Street address.....

City.....*Zone*.....*State*.....

integrated CRUCIBLE steel service



Ask the Crucible inside account salesman for a run-down on all the services his warehouse offers. He's your contact with completely integrated services ranging from local delivery of the steels you need to metal research.

makes available a local

4-POINT SPECIALTY STEEL SERVICE

to both large and small users

All 32 warehouses offer
(1) simplified ordering
(2) in-stock deliveries
(3) metalworking assistance
(4) metal research

Each Crucible warehouse is a *specialty steel service center* – stocked, staffed and equipped to give you a wide range of services.

Here's what the warehouse near you can offer –

(1) *Simplified Ordering.* The inside account salesman assigned to you expedites all your orders, arranges for extra services and speeds up shipments when necessary. His personal responsibility means convenient ordering, no delays, no mistakes, nor misunderstandings.

(2) *In-stock delivery* of 16,000 specialty steel items, cut or processed to your specifications. Because warehouses maintain these stocks at high levels, you're sure of getting immediate delivery.

(3) *Metalworking assistance.* Experienced service engineers will work with your engineers to solve machining, heat treating or any other metalworking problem.

(4) *Metal research.* Crucible metallurgists visit local warehouses regularly. They'll bring the benefits of Crucible's experience and continuing research to your plant, too.

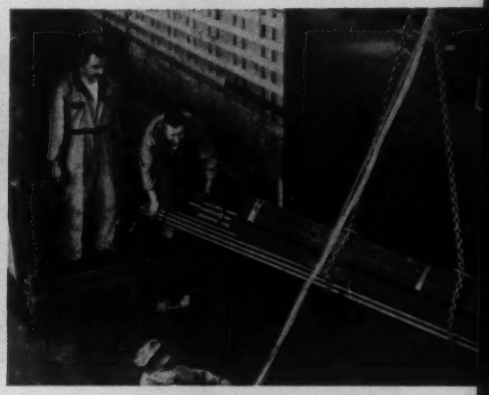
This service in depth is available because the Crucible operation is completely integrated from ore to steelmaking to warehouse delivery to you. But get full details. Ask the Crucible salesman to list all the services his warehouse offers. *Crucible Steel Company of America, Dept.* **PC06,** *The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

STOCK LIST

Keeps you up-to-date on local stocks of specialty steels. Just ask the Crucible salesman to place your name on the regular mailing list.

One Source For All These Steels

To speed up cutting on your orders, warehouses are now equipped with the latest hacksaws, and continuous-cutting and self-aligning bandsaws.



Average local warehouse continually replenishes stocks of 16,000 specialty steel items—gives you overnight delivery on almost all.

Sales-service engineers — who specialize in tool steels, stainless, alloys— will gladly help you with any type of metalworking problem.

TOOL STEELS–Water, oil, air hardening, shock resisting, hot work, plastic and die casting steels in all forms, including bars, sheets, plates, drill rod, hollow bars, forgings and flat ground stocks

HIGH SPEED STEELS–Crucible's famous "Rex"® steels: Rex Thrift Finish rounds, hot rolled and cold drawn flats and squares, drill rod, forgings, sheets, plates, and tool bits

STAINLESS STEELS – Bars, sheet, strip, wire, cold heading wire, metalizing wire, plates, angles

FREE MACHINING STEELS – Crucible Max-el®

rounds, hexagons, plates and brake die steel

ALLOY STEELS – Bars, billets, strip and sheet

COLD ROLLED CARBON SPRING STEELS

DRILL STEELS – Hollow and solid drill steels

ALUMINUM EXTRUSION DIE STEELS

HOLLOW TOOL STEEL

WELDING AND HARD FACING ROD

PLASTIC MOLD STEELS

PERMANENT MAGNETS

— and many others

CRUCIBLE STEEL COMPANY OF AMERICA

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"Rust Completely Under Control!"

CIMPLUS, rust-control specialist of the famous CIMCOOL family of cutting fluids, cuts special handling costs by more than $90 a week. (Company name on request).

2

SALES REPORT

firm makes textile machinery. They were having trouble grinding some cast iron and shell molded parts. Extremely high stock removal, using a soluble oil coolant.

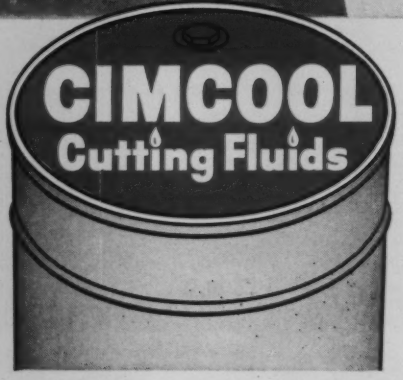
They were experiencing (1) Considerable rancidity... (2) Unsatisfactory settling of grit and sludge...(3) Parts were rusting so badly that they needed special handling. They were dried in sawdust. Rust had to be sandblasted or worn off in tumbling machines.

We installed Cimplus at 1:75. Rancidity—Now no problem. Grit settling—Excellent. Rust—Completely under control, with no special handling needed. Cimplus is saving them better than $90 a week in labor costs alone!

George Stockwell
Boston Office

VIA AIR MAIL

BOSTON MASS 1961



FOR 100% OF ALL METAL CUTTING JOBS

Production-proved products of The Cincinnati Milling Machine Co.

CIMCOOL S2 Concentrate — The pink fluid which covers 85% of all metal cutting jobs.
CIMPERIAL — Newest in the famous, industry-proven line of CIMCOOL° Cutting Fluids.
CIMPLUS — The transparent grinding fluid which provides exceptional rust control.
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ALSO — CIMCOOL Tapping Compound — CIMCOOL Bactericide — CIMCOOL Machine Cleaner.

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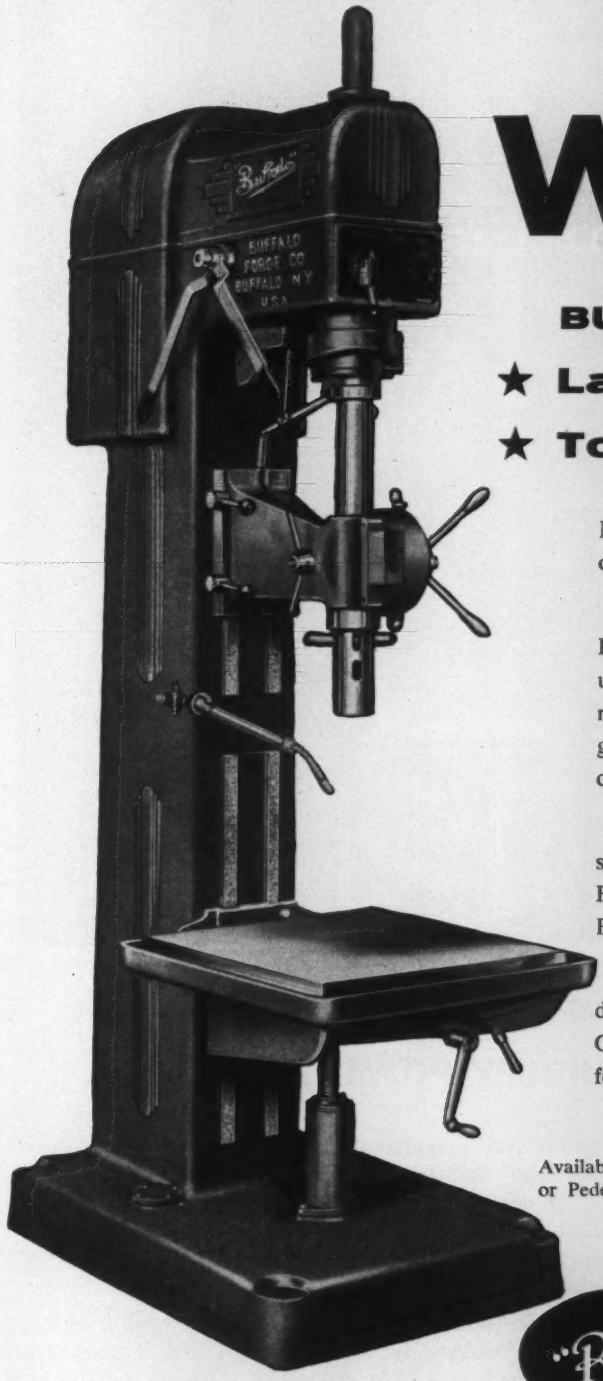
°Trade Mark Reg. U. S. Pat. Off.

THEY ALL SAID, "You just can't improve the R-P-Mster!"



WE DID!

BUFFALO No. 3A R-P-Mster

★ **Larger 2" Capacity**

★ **Torque-Controlled Feed**

Here's a new Buffalo R-P-Mster with a full-rated capacity of 2" in mild steel.

Another important feature is Torque-Controlled Power Feed, exclusive with Buffalo. This enables you to use maximum speed and feed for any given hole size. You never need worry about damaging the drill or machine gearing. Overloading is impossible with the torque control on the feed shaft.

The No. 3A R-P-Mster brings you new highs in smoothness, accuracy, quiet operation and drilling ease. Fingertip controls change speeds quickly and easily. Quality Buffalo construction assures long, trouble-free life.

Discover for yourself how you can increase your drilling efficiency with the improved No. 3A R-P-Mster. Contact your Buffalo machine tool dealer today, or write for Bulletin 3257-C.

Available in Multiple Spindle or Pedestal Models.

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BUFFALO FORGE COMPANY

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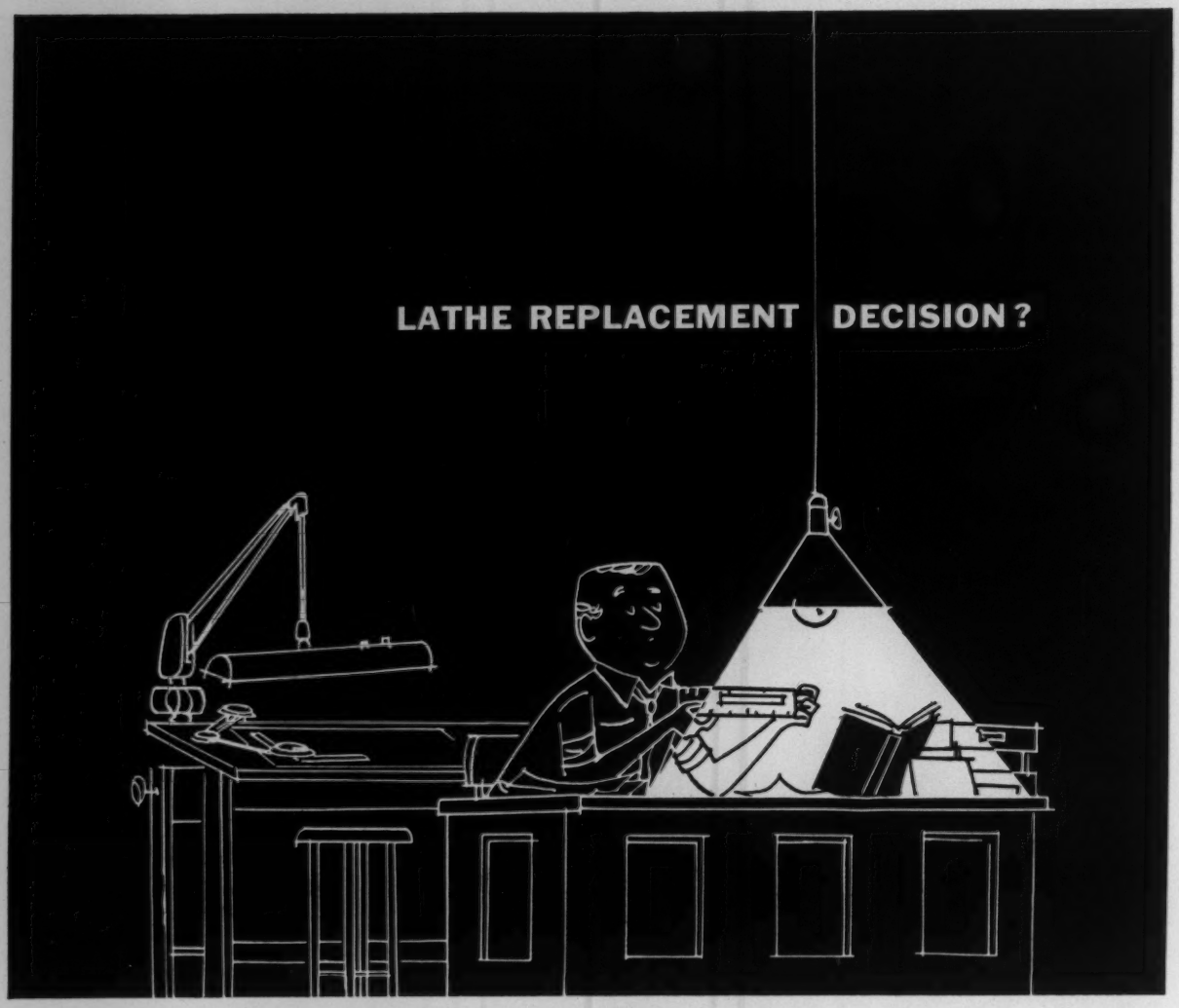
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING • PUNCHING • SHEARING • BENDING



make it logical . . . . easier, too!

LOOK AT LODGE & SHIPLEY POWERTURN

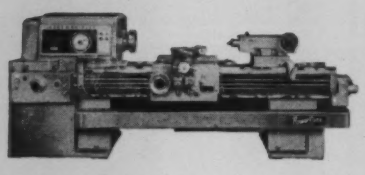
In turning . . . as in every manufacturing operation . . . there are "economic facts of life." Industry constantly demands more and better production at lower cost. This need has been filled by POWERTURN Lathes – demonstrated by case histories (available on letterhead request), which reveal thousands of dollars in cost reduction and higher output.

Base *your* replacement decision on a comparison of *any equipment* with the economic advantages assured by a really new Lodge & Shipley Lathe. POWERTURN facts will help you make a logical decision.

See details in Sweet's Machine Tool File, contact local representative through Yellow Pages or write direct for Bulletin L-104.

The Lodge & Shipley Co., 3073 Colerain Ave., Cincinnati 25, O.

Lodge & Shipley POWERTURN . . . faster, more accurate and specifically designed for newest cutting techniques and toughest alloys.



Lodge & Shipley ... your LODGE-ical choice

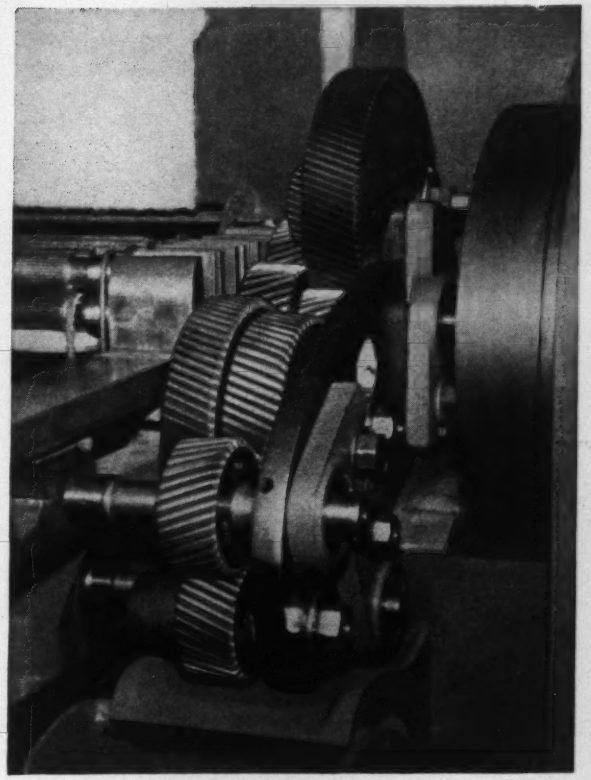
Put strength, long life, silence into gears and couplings with CDF Celoron® molded plastics

WORK MIRACLES IN MACHINERY with this amazing golden phenolic material! Celoron gears help eliminate noise and reduce wear on mating metal gears. Even the roughest-used helicals last . . . and last . . . and last.

HIGH MECHANICAL STRENGTH. Typical Celoron strengths: tensile, 6,500 psi; flexural, 10,000 psi; compressive, 25,000 psi; shear, 8,500 psi. Dimensionally stable and readily machined, Celoron fills the bill where costly metal parts fail.

ELECTRICAL INSULATION VALUE. Celoron is a non-conductor with high electrical insulation value. It makes ideal mechanical-electrical parts. Celoron couplings effectively insulate motors from driven machinery.

CDF FABRICATION SERVICE. Let the plastics-fabrication and molding experience of CDF save you time and money, and assure you delivery of production quantities of CDF plastics and molded parts—on time and as specified. The CDF man can help you from the very beginning. See his phone number in the Product Design File (Sweet's). Or send us your print or your problem, and we'll return samples and technical literature for your evaluation.

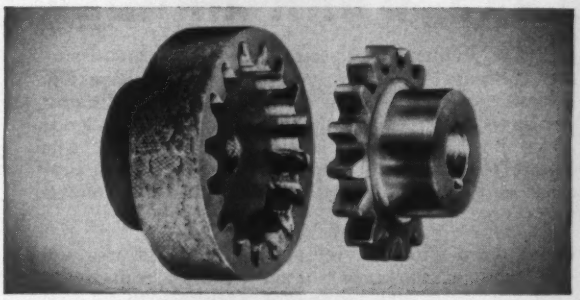


CELORON-TO-CELORON GEARS in drawing rolls made by Ideal Industries, Inc., Bessemer City, N. C. These are helical-cut gears—the toughest to machine, requiring the toughest material. Celoron is it. Other Celoron parts for this application are shown below, top right.

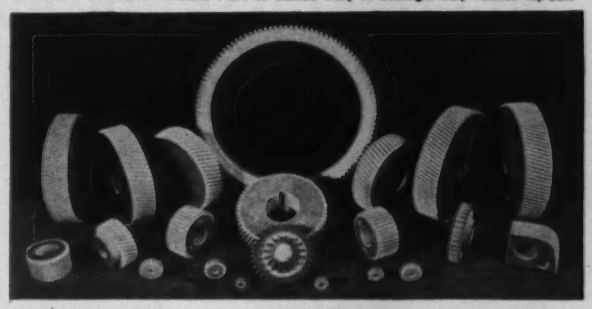
CONTINENTAL-DIAMOND FIBRE

A SUBSIDIARY OF THE Bakelite COMPANY • NEWARK 85, DEL.

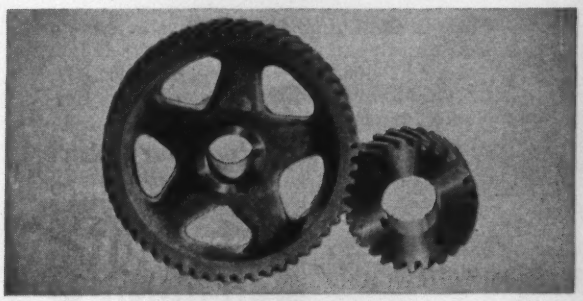
In Canada: Continental Diamond Fibre of Canada Ltd., 46 Hollinger Rd., Toronto 16, Ont.



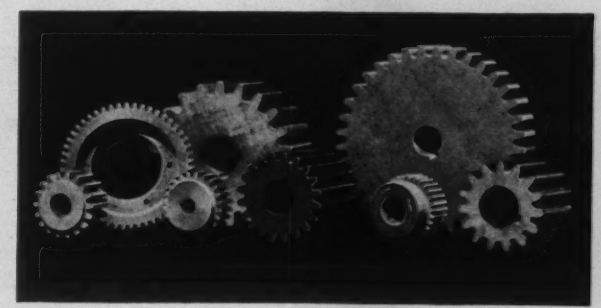
LOW-COST, EASILY-ASSEMBLED CDF Celoron flexible coupling transmits power smoothly, silently . . . insulates motor from machine . . . needs no lubrication . . . works vertically or horizontally.



PRECISELY MACHINED KEYWAYS help keep these Celoron parts silent and strong in the Ideal drawing rolls illustrated in top photograph. Note wide range of sizes and shapes.

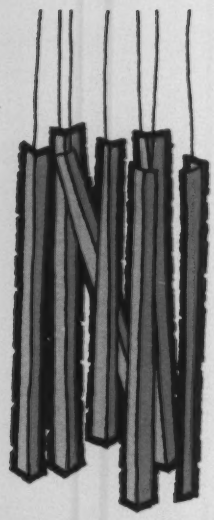


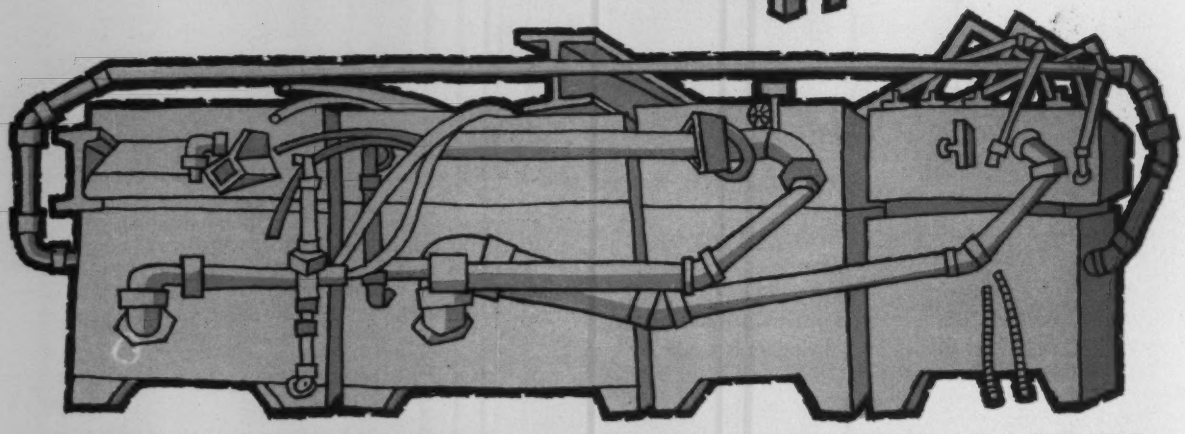
CELORON-TO-STEEL combination makes this long-wearing timing mechanism for gasoline engines. Celoron gear absorbs shock, cuts sound to a minimum, holds timing longer.



STRONG, SILENT CELORON makes both drive and driven gears. In fact, many machine applications are 100% Celoron geared for light weight, elimination of excess play, long life.

when CHEMICALS and MACHINES work together...

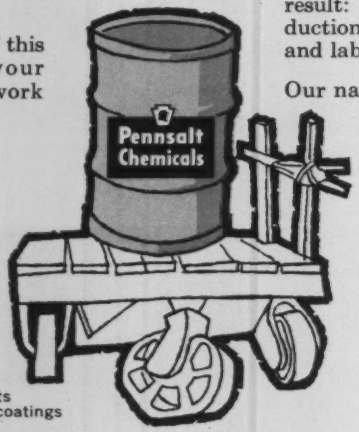




METAL FINISHING DOLLARS WORK HARDER

If you operate a medium-sized aluminum fabricating plant, for instance, your annual cost of chemicals used to prepare metal surfaces for finishing may total around $60,000, while your automatic equipment for these processes may have cost a half-million or more.

You can get the most out of this investment only when your machines and chemicals work together. Pennsalt's System Approach to metal surface preparation gives you this economic extra. Because we supply both chemicals and equipment, we have the specialized know-how to treat your metal finishing line as an integrated system. The result: your investment pays off in high-speed production, product quality, lower costs for chemicals and labor.



Pennsalt Metal Finishing Equipment
Washers
Automatic coating machines
Automatic phosphatizing machines
Automatic pickling machines
Drying and finish bake ovens
Paint spray booths
Complete finishing systems

Pennsalt Metal Processing Materials
Cleaners for all metals
Etchants and brighteners
Descaling and pickling compounds
FOSBOND® phosphating agents
FOSCOAT® pre-lubricant coatings
FOSLUBE® drawing lubricants
DRAWCOTE® deep-drawing lubricants
Paint strippers and strippable vinyl coatings

Our nation-wide service organization assures you of *continued* top performance from chemicals and equipment. Our trained specialists not only aid in installation and start-up, but also make regular service calls to keep your finishing line running at its best.

Let us show you how the Pennsalt System Approach can make your finishing dollars work harder. Write for free Booklet 309, "The Pennsalt Metal Preparation Service Plan."

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Pennsalt Chemicals®
ESTABLISHED 1850

BUSINESS ESTIMATES FOR 1960 now reflect a more realistic appraisal than the extreme optimism of a few months ago. Some significant estimates for the year: Steel, 120 to 125 million ingot tons; autos, 6.2 million; new plant and equipment spending, $36 billion; housing starts, 1.2 million. A general prediction: Tightening competition in almost every field of metalworking.

RESULTS OF THE NEW CENSUS, which starts next month, will provide new, valuable data for manufacturers. More information will be collected than ever before. One in every four households will fill in a detailed questionnaire on appliances owned, cars in the family, etc. Information will be fed into computers and some preliminary reports will be available before the end of this year.

KEYING RESEARCH TO SALES THINKING may be the best single source of new product ideas. One major company, analyzing 288 solid new product ideas, found 14 originated with sales managers, 75 with salesmen, but laboratory researchers came up with 142 new product ideas that were considered worthwhile. Least productive in ideas, top management with only four.

ARE COMPANIES GOING TO EXPAND FOREIGN GOODS purchases? Here's an indication from the Survey Committee of the Purchasing Agents Assn. of Chicago. Asked, "Will you continue to buy foreign-made goods?" 18 pct said yes, 17 pct no, and 65 pct said they did not buy. Of those saying they will buy imports, price was the dominant reason. Others were design, quality and delivery, but these points were mentioned by a distinct minority.

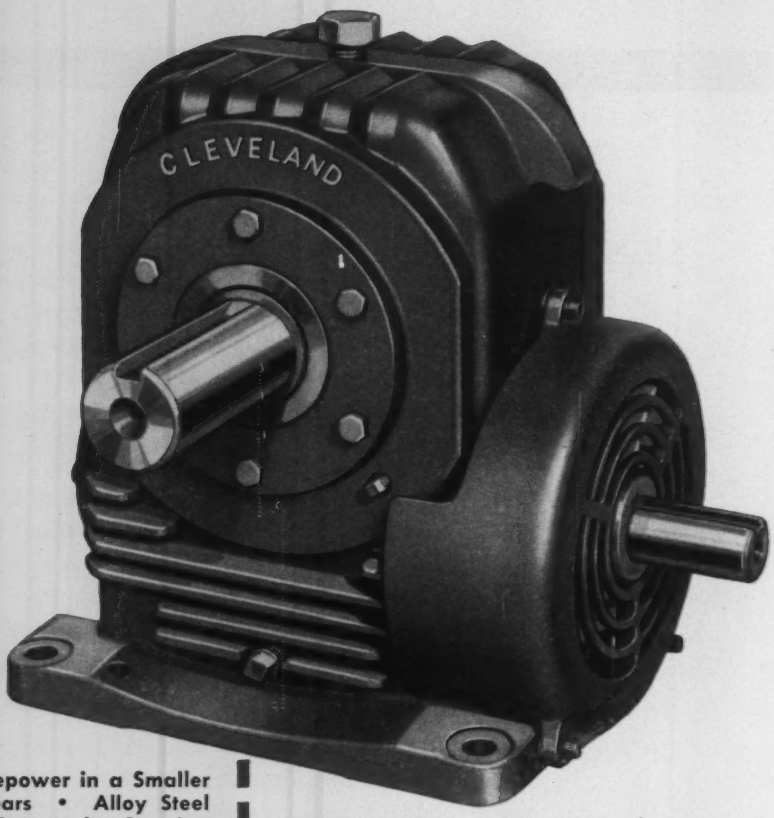
NEW ORDERS FOR MACHINE TOOLS held relatively steady in January. The total of $57 million net new orders for metal cutting and forming tools is down slightly from the December level of $58.3 million, but in line with the general rate of the past six months. Orders from foreign sources for metal cutting tools increased to $9.55 million, continuing an uptrend in foreign business that started last June.

HERE ARE SOME EUROPEAN COMMON MARKET indicators: Industrial production in the six countries in the third quarter, 1959, was about 49 pct over the 1953 level. This is a main conclusion of a new series of indexes published by the European Community Statistical Office. Taking 1953 production as 100, the third quarter figure for 1958 was 138, and for 1959, 149.

here's the really new

Cleveland Worm and Gear

SPEED REDUCER



It was Designed to Provide: High Horsepower in a Smaller Unit • Centrifugally Cast Bronze Gears • Alloy Steel Worms Heat Treated By An Exclusive Process for Carrying Higher Loads • Fan Cooling for More Efficient Operation • Maximum Overhung Load-Carrying Capacity • Ribbed Housing for Maximum Strength and Heat Dissipation • Modern, Streamlined Design to Enhance Your Machine's Appearance.

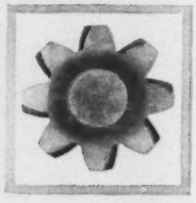
Cleveland's new speed reducer line meets AGMA Standard 440.03 — which permits higher horsepower and torque ratings — provides you speed reduction at savings of 50% or more on cost per horsepower. All this, with no deviation from Cleveland's standards of quality and dependability.

Remember, this strikingly new line of fan-cooled reducers — now available from one to forty horsepower — incorporates all the design knowledge gained by Cleveland's engineers over the past 47 years — plus all the advantages of modern metallurgical techniques and advanced manufacturing processes. Consult your Cleveland Representative for the complete story on this new speed reducer — or write us direct for Bulletin No. 405. It details input horsepower and output torque ratings, service factors, application and load classifications, as well as general over-all dimensions.

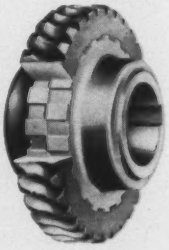
Cleveland Worm & Gear Division
Eaton Manufacturing Company
3282 East 80th Street • Cleveland 4, Ohio

CLEVELAND
Worm Gear
Speed Reducers

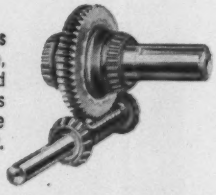
Check these new exclusive Cleveland features



Cleveland's Worm's, heat-treated by an exclusive process, possess a high degree of hardness throughout their entire thread thickness — and well below the worm's root diameter. This gives maximum thread strength and resistance to wear without losing the advantage of a tough core of medium hardness.



Centrifugal cast bronze rims have a greater density and a higher hardness, giving increased resistance to wear and fatigue pitting. They are centrifugally cast integral with cast iron centers on 6" and smaller sizes. This permits strong mechanical keying of the two parts — without dependence on actual surface bond. Gear shaft extension diameters are especially large to permit greatly increased overhung load capacity.



Worm and gear shaft bearings are Timken taper roller type, providing adequate thrust and radial capacity. Worm bearings are mounted directly in the housing bore for greater rigidity.

Is a "Normal" Year Good Enough?

You'll Get the Answer in 1960, Maybe the Hard Way

Although all signs point to a near-record flow of business this year, the bears are out, too.

Even in a top year, competition is tough. You'll have to be ready.—By Tom Campbell.

■ The slap-happy drug of New Year's forecasting has worn off. In its place is a down-to-earth reaction. Now we are getting some sour reawakenings and so forth. In a month or so, we will get a sound — and perhaps more optimitic — outlook for the balance of this year.

Some of the recent statistical muttering is a little too pessimistic. If it isn't really so pessimistic, then the choice of words makes it seem so.

Steel Revised—There is no doubt that the steel forecasts for 1960 made earlier were too optimistic. But few, if any, people in or out of steel were anything but optimistic.

Now the latest estimates for steel output this year cluster around 120 million tons. Some average between 120 and 125 million tons. There is every reason to expect that this year will better the record of 117 million tons in 1955.

Rate by Quarters — If auto production in this country does reach 6.5 million cars—still a possibility—then steel output will reach and may exceed 120 million ingot tons. But it is almost a foregone conclusion that steel output will be less in each succeeding quarter.

While it is still too early to know for sure, the steel operating rate by quarters may be as follows: First quarter, 95 pct; second quarter, 85 pct; third quarter, 80 pct; fourth quarter, 75 pct. That is a lot of steel if this schedule is reached — 124 million tons of ingots. If the rate sags to the point where about 120 million tons of steel are made, then the third and fourth quarter estimate above will be slightly lower.

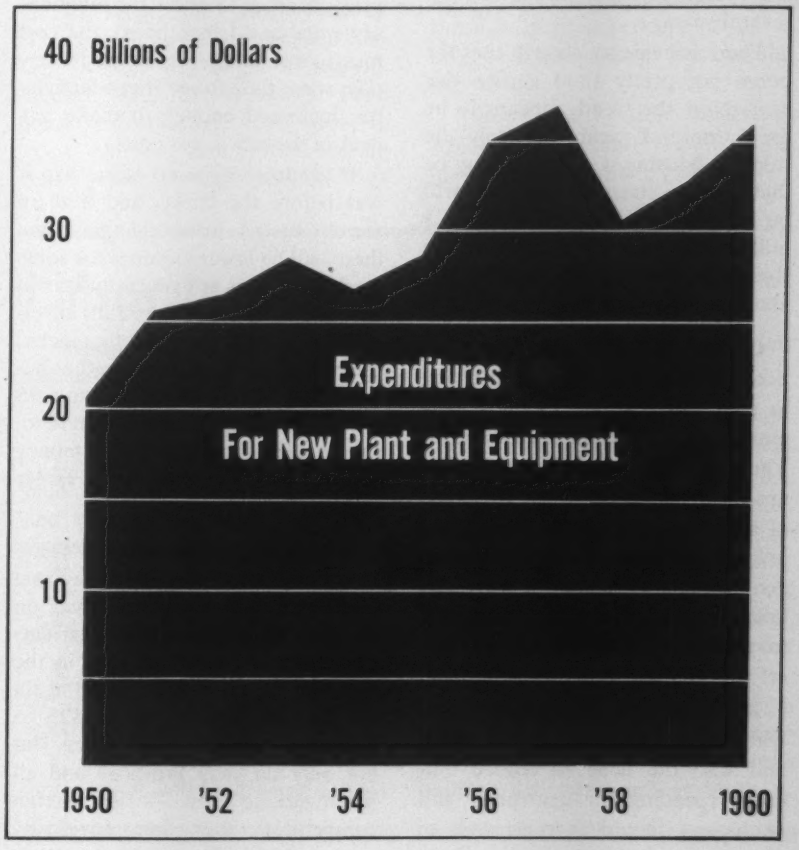
Steel Dependents — Some steel people feel that, with no rush to overbuild stocks, there will be a normal spring uplift in steel followed by a summer letdown and then a seasonal increase in the early part of the fourth quarter. No matter which way you guess, this will be a record year for the steel industry.

Since steel is to be so active, then so will be refractories, coal, iron ore output, freight car construction and all those items used by steel plants. Add to this a whopping $1.6 billion for new plant and equipment and you can see that this year the steel industry will supply much support to the economy.

Looking at the economy generally, the Federal Reserve Board's Index of Industrial Production should reach an all-time high this month.

Activity in March and April will reflect seasonal strength in such items as steel, aluminum, copper, construction, freight movement, housing, commercial activity.

Big Push From Capital Spending



Second Thoughts on 1960

Steel Production	**122 Million Ingot Tons**
Autos	**6.2 Million U. S. Output**
Housing	**1.2 Million Starts**
Consumer Spending	**New Record**
New Plants and Equipment	**About $37 Billion**

Gentle leveling off throughout the year . . . No sharp or drastic decline by midyear . . . Good railroad buying of freight cars . . . A Republican president elected . . . More intense foreign competition . . . Higher costs unless new equipment replaces outmoded . . .

Economists' Predict—While there are a few economists, like Eliot Janeway, who see plenty of business troubles ahead, the majority of them feel that, while the boom has slowed down, this will be a good year. Even Mr. Janeway concedes privately (he is the bearest of the bears) that Vice President Nixon might change things, or try to, for political reasons. Also, there may be a spring pickup in auto sales as there was last year—for the first time in several years.

There is evidence though that the boom got pretty tired earlier this year. Now the trend appears to be for a "normal" year. Certainly the trend in housing is down. It may be that average starts for the year will be 1.2 million, compared with 1.375 million last year. Further, there are signs that construction will be just about equal to last year's record.

Capital Spending—Biggest question marks to businessmen in trying to plan this year are probable new plant and equipment expenditures. There is plenty of evidence that we are on a fast uptrend for this type of spending. The IRON AGE plant and equipment appropriation studies confirm this. Whether it will gain enough speed and volume this year to prevent a rather sharp leveling off late this year remains to be seen.

But so far, the probability is that with inventory buying slowing down and with the need to reduce unit costs, spending for new plant and equipment should average close to the record of $37 billion reached in 1957. If this comes to pass, then business can take time to prepare for a mild correction in the latter half of 1961 — or perhaps a little earlier than that.

Strive for Productivity — There are more than statistics staring businessmen in the face. Take the smaller steel firms. Their costs have gone up faster and higher than those of the bigger units. Since there was no price increase to offset the inflationary wage and fringe boost, the cost must come out of earnings. It may take some time to see if productivity has increased enough to make any dent in the new labor costs.

If productivity is no more than it was before the strike, and if there are to be no price changes, then there will be lower earnings for some steel firms. It is not generally known that when the ingot rate falls off to about 75 to 85 percent of capacity, the rate of earnings is somewhat below what it is between 85 and 95 percent of capacity operations. Also, the smaller firms make less money at the lower rates than do the larger units.

Modernization Needed — There is no assurance that need for steel in Europe will have any effect on the flow of below-domestic-market-priced foreign steel. In fact, in the past few weeks the trend is on again for foreign steel to sell at $25 to $30 a ton below domestic price. But not only do steel firms — and all metalworking firms — face foreign competition, they face terrifically tough and rough competition with each other.

Steel companies must pay for their expansions and new equipment. So they have to get more customers. The same goes for electrical machinery makers. Same for machine tool makers. So that even though statistically this year looks like a banner one, the problems of trying to make a profit for individual firms and industries is no easy matter. And in the next few years it will be even tougher. This goes for all metalworking.

Where It Goes — It is because of these problems that capital goods makers, electronics manufacturers and market research managers look with some optimism at the period ahead. Prices have to stay stable — or at least not rise too fast. Competition here and abroad will almost guarantee that. But if labor still gets its "package" as it did in steel and in other industries, then automation, new plant and new equipment must be bought—or the firm either goes broke or becomes a marginal plant barely holding on.

In 1960 you will hear a lot about stabilization. Actually, there is no such thing. Business, prices, production and sales are either going up or coming down. In some cases, prices may appear to be steady, but other factors such as freight absorption, special deals, local competition to be met, substitution of products, and a host of other methods the buyer has at his disposal bring changes upward or downward.

Leveling Off — With capacity to produce far more than is being purchased, heavy industry, consumer durables, and construction contractors will be busy this year trying to find ways and means to keep their forces intact, their sales up to par and to realize their future potential. There will be no easy road to these goals this year or for the next few years ahead. The periods of shortages and, hence, bulges in production and prices are becoming shorter in duration and are going to turn up far less often than they have in the past.

Management Girds for a Fight

It's Determined to Turn the Labor Tide This Decade

The usually quiet personnel conference of the American Management Assn. was explosive this year.

Industry served notice the unions can expect few pushovers.—By K. W. Bennett.

▪ "Management's major concern in the next few years is to break the union monopoly. Bethlehem and Youngstown couldn't merge. Why can Bethlehem and Youngstown workers bargain as a unit?" This is the view of Maytag's outspoken personnel vice president, Dr. E. F. Scoutten.

Others Say—Other top men have this to say about the labor outlook for the next decade.

J. F. Finnegan, head of the Federal Mediation and Conciliation Service. "Management is getting really rough for the first time. Union men know it and they're worried. Some companies that were a pushover at the bargaining table are spoiling for a fight nowadays."

Vice president N. A. George, Brunswick-Balke Collender: "Feather-bedding is a literal sin. Any work that doesn't result in productive output, has got to be eliminated. The primary problem of the '60's is to get costs down until we can compete in a 'one world' market."

Lid Comes Off — The panel spoke at American Management Assn.'s usually staid Mid-Winter Personnel conference. This year the lid was off. Here's what nine personnel vice presidents see in the decade ahead.

On the Minus Side—This year the medium wage for 2.5 million U. S. workers will rise by 8¢ per hour. At least 30 pct of U. S. labor contracts will provide for as much as four weeks vacation with pay. This year, and for the next decade, union leaders will battle for more insurance, particularly in high cost surgical and hospital benefits.

At the same time, union membership will continue to slip, although unions will fight it hard. A direct effort will be made to boost white collar union membership. Union leaders will work at boosting fringe benefits.

To keep workers aware of the benefits of membership, Unions will oppose subcontracting of work much more actively. The rough-and-ready organizer will be replaced by a well-trained, well-educated union leader with real skill at the bargaining tables.

On the Plus Side—But, management has some plus factors working in its favor, the panel believes. There will be fewer long strikes. The worker will begin to identify himself with his company. He'll know its objectives, and seek to boost his own firm. Profit sharing and stock buying progress are making him a shareholder in the company he works for.

Employers can withstand the union drive to organize white collar workers by stepping up white collar benefits. Commented R. F. Livingston, Thompson Ramo Wooldrige, "office unions will be a dud."

Another Plus — The escalator clause is on its way out. Unions are already meeting some stone wall opposition on the cost-of-living issue, and this will grow, the management men believe.

Management will be increasingly sensitive about its "right to manage." Even seniority rules will be questioned. Management will offer job security, but will make strong demands in return.

Adds Mr. George: "We've given away more management rights through inept supervisors than we ever gave away across the bargaining table.

"We've got to stop supervisors from asking themselves, 'Will the union let me do this?' "

Labor Issues in the '60's

Management is ready to fight at 1960 bargaining tables. But Unions are also talking a pretty tough line.

Here's what to watch for:

1. Higher benefits in company-paid insurance mainly in hospital and surgical insurance will get a determined union effort. This is high cost proposition.

2. Base pay increase of 7-9 cents per hour will be attempted.

3. Contract clauses to prevent an employer from subcontracting work will get high union priority.

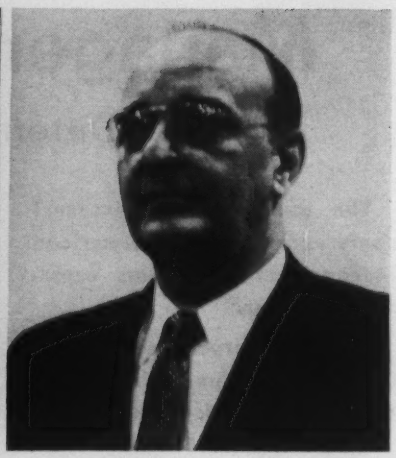
4. Increased cost-of-living escalator clauses will be discussed. This is not a major objective. It's designed to screen the real demands.

5. White collar workers will feel heavy union pressure to organize. Remedies include close management contact with white collar workers, benefits based on the old white collar-blue collar differential, and close attention to white collar grievances.

6. Imports of cheap foreign goods are hurting unions bargaining position, stiffening management's will to fight, and unions know it.

L. R. SAGAR, Dearborn Chemical Co. "Too often the sales department becomes wedded to existing product lines."

R. G. STOLL, Celanese Fibers Co. "All three departments must sit down together. . . to exchange ideas and sift the facts."



W. J. HOEING, Whirlpool Corp. "Four to five years is more nearly the average time span to move new products from lab to consumer."

Research and Sales Go Together

You can't place research groups in a vacuum and expect to get the maximum return.

They should work with sales and manufacturing departments for the best results.—By K. W. Bennett.

▪ "Surest way I know to waste research money is to divorce research from sales thinking," says Dr. H. Gershinowitz, president, Shell Development Co. "Unless the research team is fully used as a new product source, it's being wasted," he maintains.

One company recently analyzed 288 new product ideas it had received. Sales managers originated 14 new product ideas. Salesmen came up with 75. But lab researchers came up with 142 worthwhile new product ideas. Top management came up with only four ideas for new products.

Split the Team—How do you use your research team for maximum profit?

Celanese Corp. split its research team. One group moved directly into the sales department. Another moved into the manufacturing group. A third continued doing basic research or researching ideas developed by the sales or manufacturing departments.

The decision to split the research team three ways inspired some doubts. Research men often contend that close contact with sales or manufacturing results in the research team bogging down with manufacturing problems, or solving customer complaints.

Both Celanese and Shell Development say this hasn't happened. Says Dr. Gershinowitz, "Our research department has two to three times as many new ideas as it can handle." And Celanese has found the close contact between research and sales so helpful that the company gives its research men a sales indoctrination every six months.

Break Down The Barriers—How does the research man help sales departments and manufacturing? Sales departments tend to stick to existing product lines. Research men range further in their thinking. Manufacturing tends to discourage new product ideas that don't fit in with existing capital equipment. Again, the research man may break the ice, according to L. R. Sager, Dearborn Chemical Co.

In many large companies, the three departments get together in formal committee meetings. Research, sales, and manufacturing work together in developing a new product idea, from the time the idea is suggested and the research department begins to explore the idea.

W. J. Hoeing, Whirlpool Corporation, described the process at his company:

A 21 stage product development schedule is worked out. Sales works up data on markets, distribution costs, pricing. The manufacturing department figures tooling, purchasing, and production costs. Research develops and tests prototypes. All three departments work together, under a product manager, as the new product moves through its many steps to the consumer.

Working Together—How do the research-sales-manufacturing teams get results? In one Shell case history, sales reported a need for new

cutting oils. Research went into basics, found that about two-thirds of wasted energy in a cutting tool goes into deformation of the work piece, one-third into friction heat. An oil must withstand temperatures of 1000 to 1500°F, and pressures of 100,000 psi. Knowing this, a cutting oil that doubled machine productivity, increased tool life, and required less machine power, was produced.

Sales field tested the oil. From a sales department analysis of customer reports, research found it must add a rust inhibitor, make the cutting fluid water soluble, and eliminate "clinkers." Sales department then marketed the completed oil and a successful new product was added to the company line.

Even with all three departments working together to screen new product lines, it's difficult to produce a world-beater every time. According to R. G. Stoll, only one of five new chemical industry products is a financial success. Mr. Stoll, product development director for Celanese, feels that the failures occur where firms fail to combine the brainpower of the three departments to review a new product idea. The company marketing section, he adds, isn't always the best judge of a new product's potential success.

More Ideas—Other angles for use of your research department in the new product field, as developed at American Management Association's New Product Seminar at Chicago:

If you've produced a new material, perhaps as a by-product of a new manufacturing operation, try having your research men publish papers on its properties. One petrochemical producer, with a new chemical for which he couldn't spot any major uses, netted 1000 inquiries in response to papers on the material published by his research crew.

Keep at least part of your research team working at basic research. This is the source of the "surprise" product, brand new materials or processes.

Can Government Help Tool Builders?

Warnings the U. S. machine tool industry is losing its strength have stirred up some action in Washington.

Four separate studies are recommended to find out how the industry can meet its problems.—By G. H. Baker.

▪ The government is moving to help the nation's machine tool industry improve sales.

Alarmed by the critical state of the industry, government officials are asking for four separate studies.

Speed Needed—If the studies are completed swiftly and successfully, the government will be in a position to help the industry. But if the studies drag on, lacking direction, the industry will face still further painful readjustments. The weeks immediately ahead will tell the story.

The four studies were ordered by Leo A. Hoegh, director of Civil and Defense Mobilization. Mr. Hoegh acted after reading a detailed 26-page report from the National Machine Tool Builders' Association on the problems facing the tool industry.

"Two machine tool crises in 11 years are too many," says Ralph J. Kraut, former president of the NMTBA. He adds this grim warning: The machine tool industry is losing its reserve capability to cope with a national emergency. In the next war, the industry may have to start from scratch.

Steps Recommended—In an effort to get at the roots of the industry's problems, Mr. Hoegh wants the government to take specific steps.

Here's what he's asking:

Study by the Dept. of Commerce to find out why U. S. metalworking plants allow equipment to become progressively obsolete. In addition he wants to learn why companies have failed, in many cases, to take advantages of liberalized depreciation.

Import-Export Check — Investigation (also by the Commerce Dept.) on ways to increase exports. This would include a check on how foreign suppliers are manipulating U. S. markets.

A reminder (from the Bureau of the Budget) to tool-owning agencies of the Federal government on the savings through modernizing production equipment. The value of modern equipment in military and defense efforts will also be stressed.

Drafting a bill (with the aid of the Small Business Administration) which would guarantee loans for modernizing equipment.

Any of these steps could help, of course. If all four are pushed with vigor, the industry will be benefited.

Mr. Kraut, in submitting his report to the Office of Civil and Defense Mobilization, points out the five problems hurting the industry:

Increased imports. A decline in exports. The move of U. S. machine tool capacity abroad. An unrealistic tax depreciation policy. And failure of the Defense Dept.'s replacement program.

Change or Decline—"We do not know the solution to these critical problems in terms of the national security," Mr. Kraut says. "Only the government can evolve solutions in the pattern of national defense and in overall national economic planning.

"We do know, however, that without a change in the national policy as it affects this vital industry, and without adopting recommendations previously made, there will be a continuing diminuation of machine tool capacity."

Imports Stall Ore Price Rise

U. S. Steel absorbs Venezuelan ore price increase for its domestic customers.

As shippers look ahead to the new season, the outlook is for a big year, and with no price increases.—By T. M. Rohan.

■ A big season in iron ore shipping on the Great Lakes is in prospect. But it looks like the shippers will go another year without a price increase despite some political pressure in Venezuela.

Orinoco Mining Co., a subsidiary of U. S. Steel in Caracas, Venezuela, recently announced locally that prices had been increased the equivalent of 85¢ per ton. f.o.b. Puerto Ordaz, effective April 1.

U. S. Prices Unaffected—On the U. S. open market however, which uses about 1.5 million tons per year of Orinoco output, the price is unchanged per gross ton f.o.b. cars at Baltimore for 58 pct iron. Thus, the increase is being absorbed in water freight on the firm's own and chartered bottoms to avoid disturbing U. S. prices.

Lake Superior mining firms, already struggling against low priced imports (IRON AGE, Feb. 4, 1960, P. 56), are expected to keep their prices unchanged.

Price to other countries is presumably increased as most use their own ships. Bulk of the 14 million ton output goes to U. S. Steel mills, principally U. S. Steel's Fairless works.

Behind the Increase — The increase at Puerto Ordaz, Venezuela, was attributed to the cost of a bigger dock for larger ships, dredging, and other improvements: However, industry executives in the U. S. feel the increase was triggered by Venezuelan pressure for more revenue.

(Unofficial reports in Caracas indicate the iron ore price changes have disposed of the profit-tax hassle between U. S. Steel and the Venezuelan government. U. S. Steel's office in the United States refused to comment.)

Lake Traffic — Lake Superior district shipments for this year look like about 77 million tons or better compared to last year's strike-torpedoed 46.6 million.

Most fleets will be out the first few weeks in April and full fleets are planned. The largest independent, Cleveland Cliffs, expects to have almost a full fleet out the week after Easter, April 17.

Imports will travel down the St. Lawrence heavily too, contributing a bigger portion of the 42 million tons expected to come into the U. S. this year.

Taconite Troubles—Mills will be taking in good shipments to build up their stockpiles worn down by last year's steel strike and a winter of heavy production. A lucky break in December weather permitted record shipments and the expected ore shortage this winter fizzled.

In other ore developments, Reserve Mining Co., and Mesabi Iron Co. reached an agreement over taconite properties after four years in the courts. Reserve leases the properties in Minnesota from Mesabi.

C. M. White, president of Reserve and board chairman of

Pittsburgh Joins Canadian Ore Venture

ORE OPTION: Pittsburgh Steel Co. has taken an option on part ownership of Wabush Iron Co. which will mine low-grade iron ore deposits in Newfoundland, 200 miles north of the St. Lawrence river.

Republic Steel Co., which owns 50 pct of Reserve Mining, says the final agreement paves the way for expansion of the taconite plant at Silver Bay, Minn.

What Settlement Means—Mesabi was originally to be paid one-third of the profits. Instead, losses have been reported since 1955. Under the new plan, the company will receive a $1 per ton royalty from Reserve. And some Reserve stock will also be transferred to Mesabi.

Clearing the air on legality may well bring new pelletizing plants in Minnesota and Upper Michigan.

Revise Ore Prices — In another quarter, a revised pricing system, with premiums and penalties for oversize and undersize ore, is arousing interest. An established grade of Mesabi iron ore, Oliver 13, will be delivered this year for the same base price of $11.45 as last year. But there will be new differentials for sizes over and under ½ in.

The price discount for fines should make it attractive to mills wanting fines for their own sinter operations but there probably will be lesser demand for the premium coarse ore.

Pittsburgh's Purchase — In still another industry shift, Pittsburgh Steel Co. has moved to gain greater control over iron ore reserves.

It has purchased Bennett Mining Co., Keewatin, Minn., an open pit operation which will supply up to 500,000 tons of ore per year. It has also acquired 25 pct of the Lake Mining Co. of Biwabik, Minn., which will deliver 250,000 tons annually through 1965.

And, biggest of all, it has joined the controversial Canadian Javelin operation (see map). Now being formulated by Wabush Iron Co., Ltd., Javelin will be operated by Pickands Mather and Co. This deal will yield about 400,000 tons per year of concentrates, out of a total initial production of 4 to 5 million tons. Pittsburgh will build its own sintering plant at a cost of $7 million to $9 million.

Larger Ingots Coming Soon

Allegheny Ludlum Plans New Furnace

Allegheny Ludlum Steel Corp. will build the world's largest vacuum-melting furnace at its Watervliet (N. Y.) Works.

The new vacuum-melting furnace will produce ingots almost twice the diameter of the 26 in. one shown above.

The furnace, of the consumable electrode type, will produce ingots up to 50 in. in diameter. Ingots will be twice the weight of any vacuum-melted ingots being produced commercially.

The new furnace will make larger forgings and plates available to makers of aircraft, missiles and rockets. It is expected that new civilian markets for vacuum-melted materials will be opened.

The furnace will be built by the Lectromelt Div. of McGraw-Edison Co.

Steel Districts To Be Revised

The American Iron & Steel Institute begins this week to report steelmaking operations by districts. Until now, the Institute has reported only the national steel operating rate.

Reporting of district rates was pioneered by The IRON AGE in the twenties as a business barometer for 13 steelmaking areas. The new data of the Institute covers 11 steelmaking districts. Beginning next week, The IRON AGE will report on the revised basis. A list of plants in each district, with their rated capacities, will appear in The IRON AGE, March 10 issue, starting on p. 88.

Bethlehem's Plans

Bethlehem Steel Co. disclosed in its annual report that it plans an H-Iron plant in the Los Angeles area. Production should begin in 1960.

The company also revealed it is negotiating for the development of a large iron ore deposit in the Nimba Mountains of Liberia in Africa.

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How MOTOROLA punches TV chassis faster and cuts scrap loss. Typical of how a Multipress Analysis Program can help you **MAP** superior production methods.

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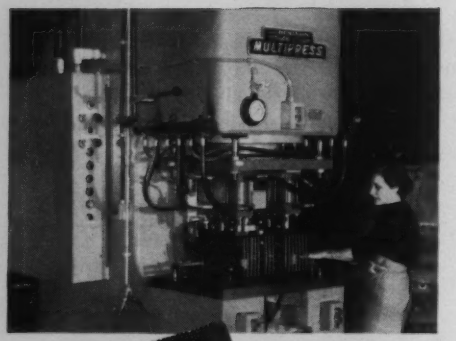

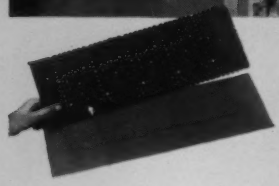

450 HOLES AT A TIME ...*a 100-ton Denison hydraulic Multipress precision-punches radio-TV chassis at Motorola, Inc., Chicago. Plastic chassis bases are shown at left, before and after punching.*

NO SCRAP problems on this pressing job. And Motorola radio-TV plated-circuit plastic chassis bases produced at this Chicago plant are precision-punched faster . . . more accurately . . . at less cost with Denison hydraulic Multipress.

Here's why: With one quick ram stroke, a 100-ton Multipress punches up to 450 holes at a time in each base. Multipress does the job with *no shock* . . . with absolute control after break-through. Holes are clean and smooth . . . affording the necessary, uniform plating surface inside each hole. There's *no bulging . . . no cracking* around or between holes because Multipress delivers controlled hydraulic pressure.

Plus benefits with Multipress—longer die life . . . almost no punch breakage . . . handles 15 different dies for quick changeover to other full-production jobs . . . *and there's almost no scrap loss.*

Endless jobs throughout the electronic and other industries can be done better . . . for less with Denison hydraulic Multipress—capacities from 1 to 100 tons. Ask your Denison Production Specialist to show you how with a **M**ultipress **A**nalysis **P**rogram made in your plant now—at no cost. It's the first step to **MAP** new savings in your production operations.

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Paul B. Wishart

From One Career to Another

Paul B. Wishart was always career minded. But changing world events changed his plans.

Instead of being a career-man in the Navy, he is now President of Minneapolis-Honeywell Regulator Co.

PAUL B. WISHART: "Still a salesman at heart."

▪ As president of Minneapolis-Honeywell Regulator Co., Paul B. Wishart directs the activities of one of the world's largest makers of automatic control equipment.

He began his business career at 25. However, this was after his boyhood ambition was scuttled. From childhood Mr. Wishart had wanted a military carrer. He won appointments in competitive exams to Annapolis and West Point. He choose Annapolis and was graduated seventh in his class in 1920.

Changing Times — But subsequent events changed his plans. When the world's major powers sat down at the peace table in 1923 and pledged to disarm, Mr. Wishart's and the naval career's of many other young officers came to an end.

His first job in the business world was directing visitors through the Packard Motor Car Co. in Detroit. It was in the auto industry that Mr. Wishart's ability, leadership, vigor and high personal goals gained him his first business success. It came first in various manufacturing assignments and later as a top sales executive.

Salesman at Heart—"I guess I'm still a salesman at heart," Mr. Wishart says, "because I still consider getting a name on the dotted line one of the biggest thrills in business."

At the outbreak of World War II he made a quick decision. Two days after the attack on Pearl Harbor Mr. Wishart applied for active duty with the Navy. But an Annapolis classmate, Capt. Robert Barry, then aide to Navy Secretary Frank Knox, urged him to apply his business experience on the home front.

He did. Honeywell was already in war production and gearing itself for even greater defense output. Honeywell turned to war work that would best utilize its skill and production techniques. The job of finding such work fell into the hands of Mr. Wishart. And he became a well known figure in the Pentagon.

To The Top — During these years, while his firm was turning in an outstanding war record, Mr. Wishart rose to the post of superintendent of manufacturing and later factory manager. In 1946 he was named vice president in charge of manufacturing. In 1952 the company created a new post—that of general manager. And Mr. Wishart was selected to fill it.

A year later he was appointed the company's fourth president.

Many Interests — Like the firm he heads Mr. Wishart is a man of many interests. Active in civic affairs, he has held offices in the Minneapolis Chamber of Commerce, the local chapter of the Navy League and the Associated Industries of Minneapolis.

NO CORROSION ON STRIKE-BOUND STEEL KEPT BRIGHT WITH FERRO-PAK® BY CROMWELL

For 116 days one of the largest producers of steel held thousands of tons of polished steel—unable to move it because of the strike.

Most of this plate was covered with Cromwell Paper Company's Ferro-Pak VCI paper—the packaging paper that provides an invisible protective film of chemical vapors to guard against rust. Through hot days, cool nights, weeks of sultry, steamy weather, the steel was protected. When the paper was removed, there was no edge rust. The steel was almost 100% rust-free.

Steel held in the same plant without Ferro-Pak protection was heavily attacked by rust.

Non-toxic vapors of Ferro-Pak are effective almost indefinitely. With any ferrous product, you simply wrap it and it's rust-proofed; unwrap it and it's ready for use. No dipping, slushing, scraping. No expensive cleanup.

Ferro-Pak comes in rolls, sheets, bags, envelopes, liners and covers. And we combine it with many other materials for a wide range of uses.

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How Census Will Aid Marketers

Census of U.S. population beginning next month will also include questions on housing, autos, and appliances.

One in every four households will fill in a detailed questionnaire.

▪ Next month the U. S. census on population and housing gets underway. When the results are in, you, as a businessman, will benefit.

The data obtained this year will be more detailed than ever before. It should reveal a great deal about the U. S. consumer—and his buying habits. It should provide valuable marketing data for the 1960's.

One in Four—During the census, all Americans will be asked the usual questions about age, date of birth, marital status, etc. In addition, at every fourth household census takers will leave a questionnaire to be filled in and returned within three days.

Two versions of this questionnaire have been drawn up. One will be used in cities with a population of 50,000 or more. The other will be used in smaller cities.

Included are questions asking when the house was built, its rental or sale value, type of heating equipment, and whether or not it contains a telephone.

Added Questions — More detail will be included in a questionnaire going to a 20 pct slice of the nation's population. They will be questioned on the number of rooms in the structure, the type of basement, and (in large cities) whether the dwelling has an elevator. Another question asks, "How many passenger automobiles are owned or regularly used by the people living here?"

For a 5 pct sample of the nation, the questions are even more detailed. This group will be asked about the number of television and radio sets, the fuel used most for heating, cooking, and preparing hot water. They will be questioned on whether they own an air conditioner, a home freezer, a washer, and/or dryer.

Construction Details — Since the last census in 1950, questions have been revised to pinpoint the condition of U. S. housing. This year there will be a section describing the gross changes in housing inventory. This will show the amount of new construction, conversion, merger and demolition.

The physical condition of the house itself will be carefully classified. In 1950 a house was either listed as "not dilapidated" or "dilapidated." This classification has now been subdivided into "sound," "deteriorating," or "dilapidated."

The data collected in the housing census will be fed into electronic computers for processing.

Controls Offer Challenge

▪ Problems involving automatic controls are getting closer and closer to the top management level.

That is the conviction of George M. Muschamp, engineering vice president - industrial products, Minneapolis - Honeywell Regulator Co. Says Mr. Muschamp: "The scope of automatic control problems is constantly widening. This is taking the problems—and the decisions—higher and higher and therefore closer to top management."

More Attention — He adds the costs of solving the problems and their effects on the organization require more management attention. "Management is taking a more attentive, if not more aggressive, position with respect to automatic control.

"Managers have seen ample demonstration, not only in the plant, but also in the office and in the laboratory, of what automatic aids can do. As a result, programs once difficult to justify may now be more readily accepted by management."

Automatic controls offer challenges to instrument makers, as well as users, Mr. Muschamp notes. "Basic to this challenge is providing controls engineered to insure proper integration of complex equipment in economically and technically sound systems."

Labor Complaints Keep Rising

Labor-management discord is at high levels. Unfair labor practice complaints issued by the National Labor Relations Board reached a record in the last quarter of 1959. In all, 369 complaints were issued, the greatest total for any three months in the board's history.

Charges of illegal practices — against employers, against unions, and against both — have increased rapidly in the last two years. In the final quarter of 1957 there were only 141 complaints.

AN IRON AGE SPECIAL REPORT TO MANAGEMENT

Materials Management Concept Stirs PA Debate

Should all flow of purchased materials be centralized in a single purchasing authority?

It's the hottest procurement subject since value analysis arrived.—By G. J. McManus.

▪ Still stunned by the sudden change in inventory outlook over the past 60 days, industry is beginning to wonder if a new approach to materials management may not be gaining ground.

The new concept establishes central control of the whole materials package. Traffic, inventory control, buying, and related functions are unified under one man. The split in materials matters between purchasing and manufacturing is ended.

A Buzz Word—This idea has become a storm center in purchasing circles.

"Materials management is the greatest buzz word to hit the purchasing profession since value analysis," says A. M. Kennedy, Jr., vice president, purchases and traffic, Westinghouse Electric Corp.

Until recently, however, it was not clear that either top management or even purchasing men had really accepted the principle of unified materials control. Now there are signs the system is taking hold, at least on an informal basis.

Steel an Example—Biggest indication of new inventory thinking has been the behavior of steel stocks over the past 12 months. Steel inventories have turned around four times in a year's time. There was the pre-strike buildup, the strike liquidation and the push that followed the strike. Now another cutoff seems near.

This last twist is the most surprising. Four months after the longest steel strike in history, users are apparently satisfied they have a big enough steel cushion. The quickness of this reaction is pointed up by the fact that past steel buildups have run at least 18 months and have taken about six months to turn around.

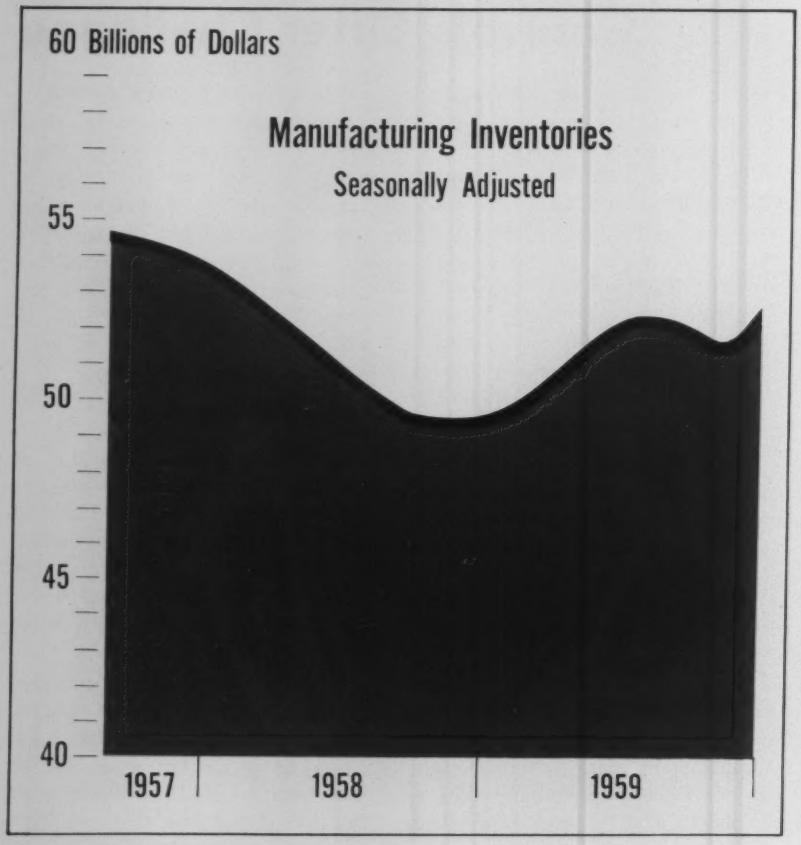
Control Conscious — "This has dramatically shown the new consciousness of inventory control," says E. F. Andrews, director of purchases, Allegheny Ludlum Steel Corp.

Former head of the National Assn. of Purchasing Agents (NAPA), Mr. Andrews has long plugged for better control of inventories.

"Purchasing agents have a responsibility to moderate economic swings by maintaining tighter control of inventory," he says.

Apart from this broad responsibility, there are hard, immediate reasons why companies are bearing down on inventories. The average concern puts about 50 pct of its

Can These Curves Smooth Out?



Two Top Men With Different Viewpoints

A. M. Kennedy, Jr., V. P., purchases and traffic, Westinghouse Electric Corp.:

"Materials management is the greatest buzz word to hit the purchasing profession since value analysis.

"It makes a great deal of sense to have one man with the authority and responsibility of coordinating all phases of the material problem from the inception of requirements through the inventory control cycle, through procurement, transportation, and delivery to the floor."

T. O. English, general purchasing agent, Aluminum Company of America:

"There is a place for materials management in certain sizes and certain types of operations. In others, there is not.

"The place where it seems to fit best is in smaller operations. Here it is often better to have one good man looking after a number of duties than to spread jobs among several men. In these situations, Alcoa does, in effect, have materials managers."

gross income into purchased goods and services. Industry leaders have come to recognize that an outlay this size rates the best possible management.

Unified Responsibility—The purchasing school represented by Mr. Andrews and Mr. Kennedy feels this kind of management is most likely if responsibility for materials is centered in one department.

"It makes a great deal of sense," says Mr. Kennedy, "to have one man with the authority and responsibility of coordinating all phases of the material problem from the inception of requirements through the inventory control cycle, through procurement, expediting, transportation, inspection and delivery to the floor."

Integration can be carried even further. There are those who say all inventory — process stock and finished goods as well as raw material—should be controlled centrally.

Backers of these concepts argue that the traditional split in responsibility has resulted in buck passing, misplaced emphasis and general inefficiency.

Purchasing Viewpoint — The causes and the correction of this kind of waste are discussed by Mr. Andrews in an analysis of unified control. He feels control should be limited to raw materials and should be centered in purchasing. Three basic arguments are offered in support of this view:

1. Purchasing has the prime desire and interest to manage materials efficiently.

2. Purchasing has most of the information needed for materials management.

3. The performance of purchasing in materials management can be measured easily.

Who's in Charge?—On the question of interest, Mr. Andrews feels one of the reasons for violent inventory swings has been the subordination of materials management to other considerations. The manufacturing man is primarily concerned with keeping production going. He wants to avoid shortages and will tend to carry excessive inventory in good times.

The financial man would like to have no inventory. When poor times put controllers in the saddle, the tendency is to cut back too far.

Avoid Extremes — In between these extremes, purchasing has its attention centered on material itself. The professional buyer must consider supplier relations. He must think ahead to future periods of tight supply. This viewpoint makes for moderation in inventory control.

Information handling is also a big consideration, Mr. Andrews feels. He points out that most of the facts needed for a buying decision come from purchasing. Lead times, market conditions, quantity discounts and other data must be secured from the buyer. On the other hand, the purchasing department must only go outside itself for one figure: Use or sales.

If control is centered in purchasing, the communications problem is smaller. This problem can be overcome with close cooperation. In practice, however, there are frequently delays and incomplete transmission.

Account for Variables — The other practical difficulty is that control offices may never get all the information needed for intelligent materials management. The widely accepted EOQ (economic order quantity) system calls for dope on lead time and a dozen other variables. Unless these variables are checked on a prompt, systematic basis, a plant is not really controlling inventory in the modern sense.

There is good reason to believe many companies are operating without any precise control.

"We're not taking something from manufacturing," says a purchasing agent of his company's new program. "We're moving into a vacuum."

Survey Conclusions—The question of how far purchasing should move was checked last year by NAPA. A committee headed by

Mr. Kennedy polled purchasing men in the steel, oil, electronic and airframe industries.

Buyers in three of the four industries wanted inventory control in purchasing. The steel industry showed the broadest extension of purchasing authority. In steel, 43 pct of the buyers checked had control of raw maerials inventories and of tool and supply inventories. A full 75 pct in steel felt this degree of control was desirable.

Could Do Better—Air frame and electronics purchasing men both wanted more responsibility. Ninety pct of the aircraft men felt the company would benefit if they had full control of receiving, raw material inventory, tools and supplies inventory.

In electronics, most of the purchasers wanted control of outbound traffic and shipping of finished product as well as control of raw materials inventory.

GE Method — General Electric favors this type of broad control.

ALLEGHENY LUDLUM'S E. F. ANDREWS: "Purchasing agents have a responsibility to moderate economic swings by maintaining tighter control of inventory."

GE has created materials managers to deal with purchasing, traffic, production control and value analysis. The traffic activity takes in shipment of finished goods as well as inbound shipments. Production control means basic planning rather than detailed order scheduling in most cases.

"I would not say we have tighter inventory control now," says a materials manager for GE. "I'd say we have better inventory control." He emphasizes that the standard should not be how much or how little inventory is carried, but, rather, how large is the return on inventory investment.

The Dissenters—Many purchasing men will go along with the second part of this statement. They don't want materials management. The NAPA survey indicated the oil industry has little interest in extending purchasing responsibilities. Oil purchasing men "are primarily buying-oriented with little involvement in inventory control, traffic, receiving or inspection." There is no push to change this situation.

Too Much Control?—The survey findings jibe with the thinking of one purchasing man in oil. A. E. Urich, director of purchasing for Gulf Oil, feels full centralization of materials management is "a good way to build up a lot of obsolescence in inventory."

"We have burned a lot of forms and junked a lot of parts when this was tried," says Mr. Urich.

He sees two objections to the concept: 1. It goes against the general business principle of separating all major functions. 2. It eliminates the checks and balances desirable for proper operation. Decisions are made without the necessary cross section of option.

More Objections—Objections are not confined to the oil industry.

"Materials management means control of production," says W. G. Blessing, head of purchasing for Blaw-Knox Co. "The two go hand in hand."

Two plants in an auto stamping system are using materials management. In one case, the top purchasing man has been drawn toward manufacturing and away from buying functions. This has tended to happen in other applications and a third plant in the system has discarded materials management.

Spreading Too Thin—Objections of many purchasing agents center on this last point. The feeling is the buying function is big enough to rate full-time attention. If inventory control and other duties are brought under purchasing, the top man will be spread too thin. He will lose touch with markets and be drawn into manufacturing matters.

Mr. Kennedy concedes this is a difficulty.

"It's quite obvious," he says, "that the administrative job of the top materials man is enlarged by several times. In a typical plant of ours, the accessory functions . . . will add more people to his roll by far than he has in the procurement section."

More Functions—The materials manager, says Mr. Kennedy, must understand something of traffic and storage and manufacturing. The broad scope of his field means he must let go of some of the buying details.

"Something has to give somewhere when the top purchasing man assumes two or three times the administrative load which he had before. . . . It requires a change of heart, a change of philosophy and certainly a change in work habits to become a materials manager."

For the concept to work, there must be a man who is broad enough and energetic enough to make this adjustment. If such a man is available, the change will come naturally, says Mr. Kennedy. If the proper man is lacking, it's a mistake to try.

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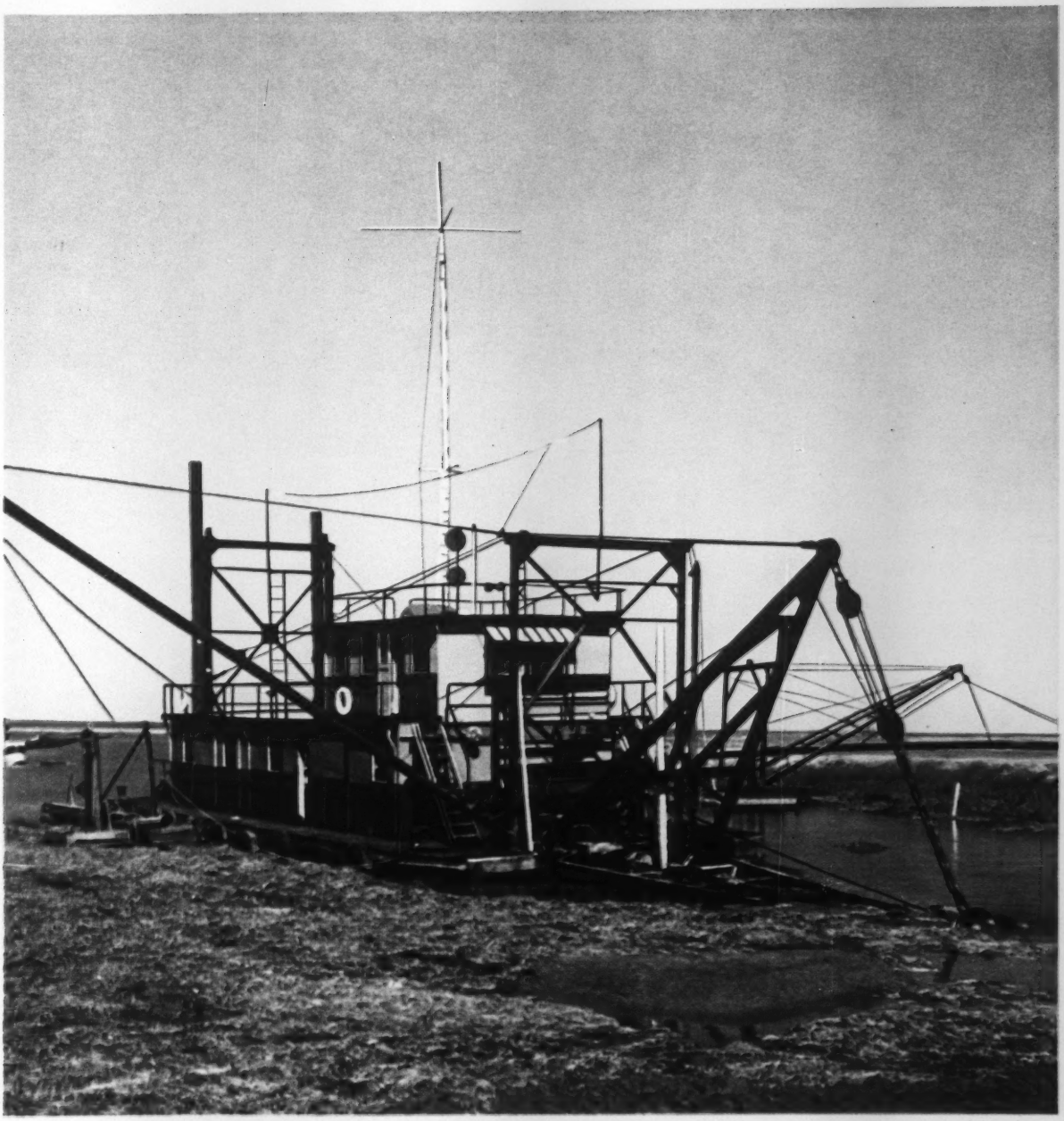

way out where wire rope had better be good

There's nothing like isolation to point up the job value of a wire rope. It's situations like this that put meat on the clichéd bones of "tried and true."

This instance—multiplied by hundreds in the gamut of industries—has contributed to the fine and *lasting* reputation of Roebling Royal Blue Wire Rope. A reputation of unparalleled toughness and strength among wire ropes.

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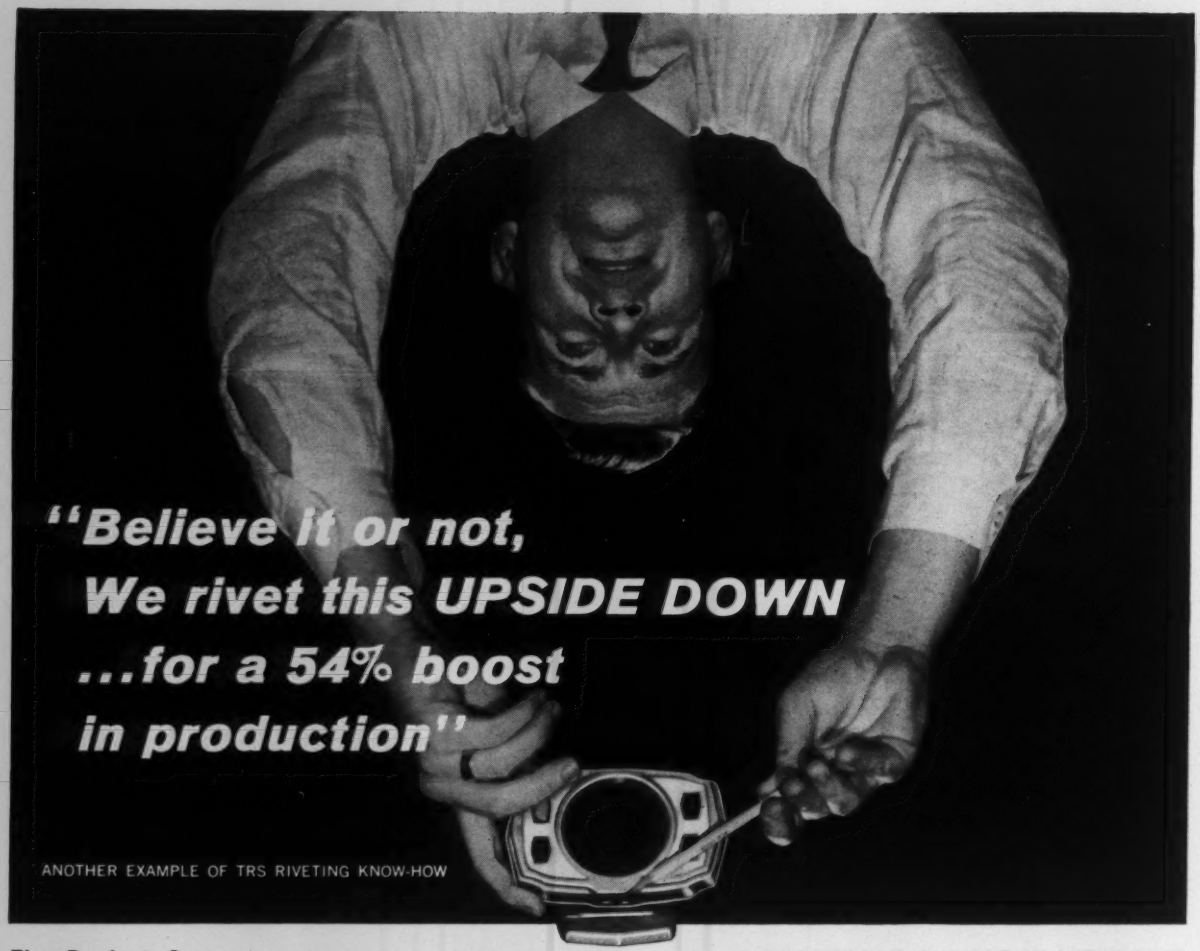


Ekco Products Company had been fastening wall brackets to their soap dishes and glass holders with solid aluminum rivets . . . hand-assembling the components and placing the assembly in a die which required two press strokes to fasten the parts. Production volume had reached a ceiling, and cost reduction was becoming imperative.

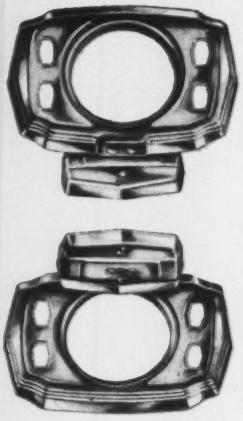
Automatic machine riveting, with semi-tubular rivets, would offer substantial savings, but obstructing flanges on the product itself seemed to rule it out . . . until the TRS man suggested a new viewpoint. Working with Ekco engineers, he proposed feeding the rivets upside down and inverting the assembly for the fastening operation, providing unobstructed travel for the rivet-setting driver. The rivets were kept with the heads visible, as required for good appearance.

Result: no hand assembly, daily output up 54%.

Let the TRS man look over your assemblies. You'll find that he has the viewpoint of a manufacturing engineer, and a knack for making fastening simpler, faster, better.

Of course he will recommend TRS rivets. But he will give you sensible reasons why they are more reliable in quality and uniformity. Superior quality control is one big result of a five-year modernization of this pioneer company — modernization of people, policies, production and service facilities. *You'll like to do business with the new TRS . . . we'll make sure of it.*

A PROFITABLE CHANGE IN VIEWPOINT



In the Ekco-Autoyre glass holder (shown) and soap dish, the rivet clinch must not be visible, but normal setting with the rivet heads on the visible surface was impossible because flanges on the product obstructed motion of the setting driver. To solve the problem, a semi-tubular rivet was designed with a flat head, to be fed and set in an inverted position with a TRS Model 103L machine. The end of the driver was shaped to form the clinch, and the machine was fitted with an air-operated pusher to eject the finished product.

Don't Buy Riveting Machines until you learn how the TRS **PAR** *process revolutionizes riveting*

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If it's a Tubular Rivet TRS makes it . . . and Better

IMPORT FIRST: Hillman Minx is first imported small car to offer a fully automatic transmission. Special sedan equipped with the unit and a heater will sell for less than $2000 at East Coast ports.

Hillman Now Offers Automatic

This is the first small foreign car with a fully automatic transmission.

Others are watching. If it works out, there'll be a lot more.—By A. E. Fleming.

■ The first small foreign car with fully automatic transmission is ready to battle compact American cars on their home ground.

English automaker Rootes Motors Inc. is offering an automatic transmission for $199 on Hillman Minx sedans, convertibles and station wagons. Price of the Minx Special sedan, including new transmission and heater, is $1994 at East Coast ports of entry. This is less than Big Three compacts with comparable equipment.

Strongest Bid — Developed by Smiths Motors Accessories Ltd., London, the transmission is being made exclusively for Rootes under a one-year agreement. Rootes officials call the automatic transmission Hillman the strongest bid yet by an imported car maker in the U. S. market. Progress will be watched anxiously by other foreign car makers. Success will certainly encourage more overseas manufacturers to come up with automatic transmissions adding even more fuel to the economy car competition now ablaze in the U. S.

Even more significant, the move may prompt domestic manufacturers to hasten the introduction of their ace-in-the-lab—the tiny economy cars. Ford and Chrysler admit they are researching such models. Chevrolet denies it.

Big Market—Large number of automatics being installed in U. S. compacts is one reason Rootes is optimistic. They are going into 70 pct of Corvair production, 50 pct Rambler, 40 pct Falcon and Lark, and 30 pct Valiant. Cost of automatics on U. S. compacts ranges from $145 on Corvair to $199 on Lark and the Rambler six.

Appraising such statistics, J. T. Panks, managing director of Rootes, says, "We feel with our automatic we can go after a much larger share of the economy car market, estimated at over 2.3 million cars with $4.8 million retail value.

Hillman Might Double — "We wouldn't be surprised to see Hillman sales double in the next two years despite American compact car competition. We can now go after that part of the car buying

public which takes automatic transmissions for granted. We can give them the convenience of an automatic plus all the benefits of the imported economy car. This will give us a particular advantage with women drivers and with families in the market for a second car."

Strengthening Mr. Panks' remarks, the Hillman automatic transmission is claimed to yield the same gasoline mileage as manual transmission models. Other automatics absorb from 10 to 25 hp and use to 20 pct more gas than manual transmissions, say engineers.

No Creep—Rootes engineers say with their automatic there is no "creep," or tendency to inch ahead after coming to a complete stop. In an emergency, the automatic Hillman can be started by pushing at speeds as low as 11 mph compared to at least 30 mph for other automatics, they say.

Unique mechanical feature of the Smith transmission is that it doesn't use oil to transmit power from engine to gear box. In transmissions with fluid coupling or torque converters, slippage wastes engine power and increases fuel consumption.

Magnetic Particles—In place of oil are a few tablespoonsful of tiny magnetic metal particles, an iron-aluminum alloy, the texture of fine face powder. The particles provide what amounts to a solid coupling between the engine and gear box when a magnetic current is passed through them.

Current comes from an electric coil operating on "orders" from an electronic brain or control center which responds to engine speed, accelerator pressure and the position of a selector level mounted on the steering column.

There are two sets of magnetic couplings, one for shifting from first to second gear, the other for shifting into third. Actual gear changing is done by a solenoid mechanism set off by the electronic control center.

Jeeps Via Seaway

The St. Lawrence Seaway is helping at least one auto company increase shipments and profits in a shrinking U. S. export market.

Shipment of "Jeep" vehicles through the Port of Toledo went up 92 pct during the first year of the new Seaway, in 1959. The resultant freight savings to Willys Motor Inc. was $141,280.

Toledo Total—A total of 3618 vehicles, including completed and boxed units, went through the Toledo port. Shipments of "Jeep" vehicles via the Seaway in 1958 were 1881 and in 1957 only 611.

L. K. Covelle, Jr., vice president and general manager of Willys-Overland Export Corp., says shipping costs for 3618 units could have been $559,862. Cost through the Seaway was $418,582. Approximate savings was $39 a unit.

Prophecy—The huge increase in exports through the Port of Toledo in 1959 bears out a prediction of two years ago: That shipments of "Jeep" vehicles would rise sharply after the Seaway opened and would continue to rise as ships maintain more regular schedules and other facilities improve.

Mr. Covelle says Willys will use the Toledo port still more in the future, providing existing freight advantage on the Seaway continues.

West to Get First Solution to Air Pollution

▪ Automakers will equip some 1961 model cars with a device that eliminates the emission of crankcase fumes. First to get the device will be those made for sale in California where smog is considered a dangerous health problem.

But last week the House permanent Subcommittee on Health and Safety indicated it would accept this as only the first step in reducing air pollution by autos. Subcommittee chairman K. A. Roberts (D., Ala.) noted, "Air pollution doesn't stop at state boundries."

And Senator R. L. Neuberger (D., Ore.) has recommended that legislation be adopted to require car producers to put the device on all cars.

Automakers' Viewpoint — But automakers want to avoid this. K. M. Richards, of the Automobile Manufacturers Assn., told the subcommittee that the air pollution problem must be approached on a community-by-community basis. He said wide variations in problems throughout the country make application of broad, sweeping solutions impractical.

Effective remedies used on St. Louis and Pittsburgh smog have been tried in Los Angeles without notable success. Each community should be studied to determine its specific needs, Mr. Richards insists. Undoubtedly thinking of the additional cost for such units, he said attempts to apply sweeping remedies across the nation would be unfair.

As it stands, the device scheduled for use in California will be engineered into the cars. Special piping and valving in the engine are needed. And each automaker will set its own price. But similar devices on the market cost from $10 to $15 factory installed. It would probably cost another $5 to $10 to install it on older cars.

Health Dept. Comments — Even so, A. S. Flemming, Secretary of Health, Education, and Welfare, told the subcommittee he wants devices to eliminate noxious auto exhaust fumes put on all new cars as soon as possible. However, he said he doesn't favor making such devices mandatory right away.

Metals PREFINISHED with these coatings have been exposure-proved on more than 1,000,000 homes

CAN YOU FIND A SAFER, SURER WAY

TO CUT PRODUCTION COSTS?

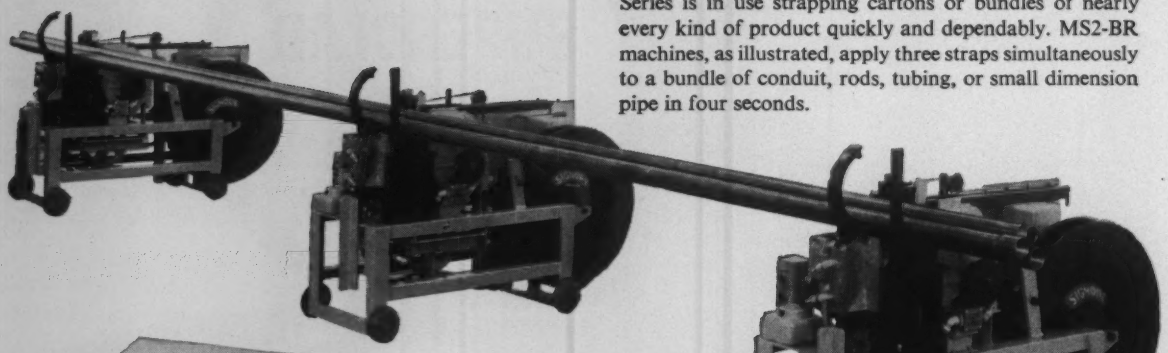
Pre-coated metals can mean assured savings in many new applications—*if you are sure of coating performance.*

Sherwin-Williams SUPERCLAD and KEMCLAD Enamels offer this assurance. Exposure-proved on exterior and interior applications including more than 1,000,000 aluminum house-siding installations, for periods as long as 14 years, they provide complete records of field performance.

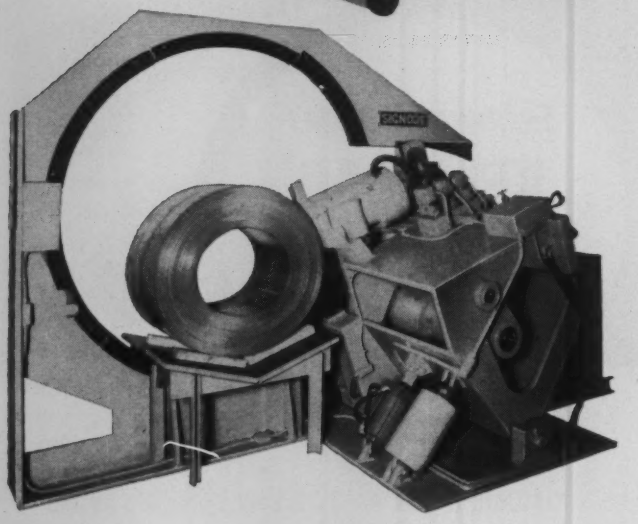
If you are not now pre-coating or using pre-coated metals, it will pay you to investigate the production savings this process may offer. And if you are using pre-coating or pre-coated materials, it will pay you to investigate the additional advantages that SUPERCLAD or KEMCLAD may offer. The Sherwin-Williams Company, General Industrial Division, Cleveland 1, Ohio.

SHERWIN-WILLIAMS / INDUSTRIAL FINISHES

Signode machines reduce packaging costs



Push-button strapping of pipe. This "work horse" M2 Series is in use strapping cartons or bundles of nearly every kind of product quickly and dependably. MS2-BR machines, as illustrated, apply three straps simultaneously to a bundle of conduit, rods, tubing, or small dimension pipe in four seconds.



Operatorless circumferential strapping of aluminum coils. Strapping is automatically centered on coils from 30" to 72" O.D. The machine straps a coil in less than 10 seconds. Other MH Series machines put 300 to 360 straps per hour on hot or cold strip steel coils or rod or wire coils...have been proved dependable in as much as ten years of the hardest kind of steel mill service.

Every day hundreds of plants prove their economy and dependability

Signode machines strap faster and at less cost—and do it dependably, with uniform tension on every strap. Tensionable steel strapping is low in cost to begin with...and high in strength to ship with. Signode has unparalleled experience in building and applying over 30 different types of these machines. Improved flow, less waste, better handling, safer transit, and lower costs nearly always result. Signode Service includes operator training and fast mechanical service on a local basis, nationwide. All of these machines are available on either an annual rental or single payment basis. It will pay you to talk to the Signode man near you, or write:

First in steel strapping

SIGNODE STEEL STRAPPING CO.

2623 N. Western Avenue, Chicago 47, Illinois

Offices Coast to Coast. Foreign Subsidiaries and Distributors World-Wide

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Defense Now a Political Issue

Democrats To Bear Down on Ike's Policies

Democrats will bear down on the President's defense policies. They call them a major Administration weakness.

The President, however, feels he has done a good job in building a top-notch system. — By G. H. Baker.

▪ Democrats have decided to bear down on what they believe to be the major weakness of the Eisenhower Administration: Delay and indecision in national military policies.

President Eisenhower is hopping mad over these charges of laxness at the Pentagon. In recent speeches and press conferences, he has blown his stack over the issue. In so doing, he raises the suspicion that he's over-sensitive on the point, and that perhaps there is something to the charges.

Best Defense System—The President is doubtless sincere in defending his efforts to build the best defense system in the world. By his standards, he has succeeded. He asks: Has he not always supported large defense budgets? Has he not sought the nation's best industrial management brains to staff key jobs in the Pentagon? Has he not been prompt in appointing committees to cope with new problems of defense and space exploration?

The question now confronting the nation is whether or not a President can "farm out" to committees and subordinates nearly all of the defense problems coming to his desk.

A Big Question—Can a chief executive do this and still supply the strong central direction that an unwieldy and expensive military program requires? Or does the multiplicity of committees result in over-compartmentalization of the military hierarchy, with officials simply writing reports for one another?

Robert A. Lovett, a Republican and Secretary of Defense in the Truman Administration, charges that the number of Pentagon committees under Eisenhower has become a "positive menace."

Delaying Tactics—He says the complex of committees that has sprung up in the past seven years is directly responsible for a "noticeable lack of decisiveness" in the Pentagon. And, because these committees become more preoccupied with staying in existence than with completing a task, the result is "vacillating administration and wavering policies" at the top level, Mr. Lovett charges.

Mr. Eisenhower, not only angry but also hurt by what he feels is unjustified criticism, has urged every member of his Cabinet to strike back at critics. How far should the Cabinet strike? Is all criticism of our defense machine to be castigated as unpatriotic blather, even treasonable talk?

The President has declared his national defense policies to be a matter of partisan politics. Result: No holds barred on this subject until the November elections.

How Rough Can Bargaining Get?

▪ Unions now have a right to engage in slowdowns and other harassing tactics during contract disputes.

Existing labor laws do not provide any power for the National Labor Relations Board to regulate harassing tactics, the U. S. Supreme Court says. The high court thus halted a drive over the past few years by the NLRB against harassing tactics as an illegal form of union pressure. The Board contended it was proof of a lack of "good faith" bargaining required by law.

All in Favor—In a unanimous decision, the Court ruled present laws show Congress intends unions and employers to have a "wide latitude" in negotiating, unhampered by excessive government regulatory power.

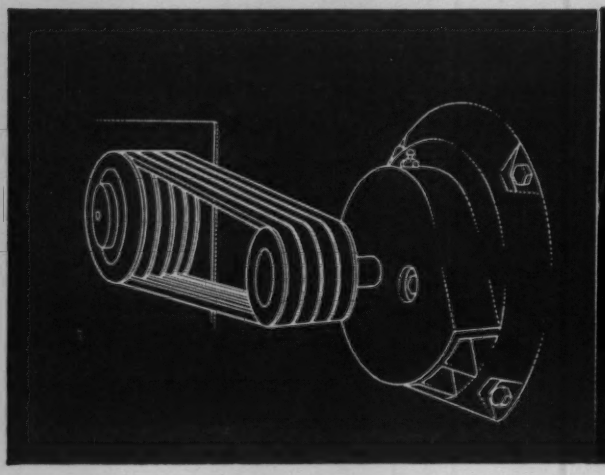
But the decision, written by Justice William J. Brennan, Jr., urges Congress to take another look at the balance of power in labor-management negotiations. It says the lawmakers may want to change the labor laws to put more stress on "pure negotiation"—that is, face-to-face talks—instead of pressure tactics outside the bargaining session.

But No Violence—The ruling permits unions to engage in almost any form of harassment during negotiations, barring actual violence. Employers have the choice of either closing down or paying workers who are disrupting operations.

The case involved Prudential Insurance Co. of America. Agents refused to write new policies, make reports, or take part in company meetings.

BEFORE: This drawing of the former 4-belt drive on a clothes pressing unit is in the same scale as the photo of new Super HC V-Belt Drive at right. Heavy sheaves needed for 4 belts imposed high bearing loads.

AFTER: By redesigning the drive for Gates Super HC V-Belts only 3 belts are required and this Utah manufacturer saves 16 pounds in weight and 24% on the drive cost of every pressing unit it makes.



Manufacturer of pressing equipment cuts cost of drives 24%

New high capacity V-belt also saves weight and space!

This manufacturer is just one of many who have already turned to Gates Super HC V-Belts to achieve far more compact, lighter weight, lower cost V-belt drives for all types of machines. With new Super HC V-Belts, sheave dimensions can be reduced 30% to 50%, overall space up to 50%, and drive weight by 20% and more.

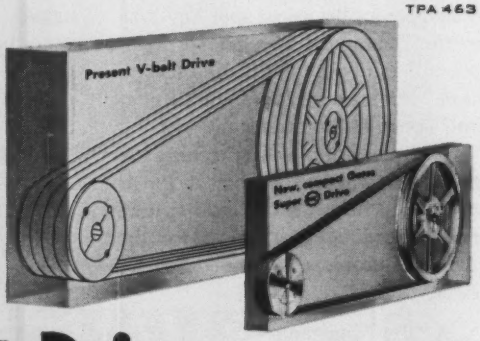
A product of Specialized Research in the world's largest V-belt laboratories at Gates, the Super HC V-Belt Drive is already standard equipment on production models in virtually every industry.

Engineering Service Nation-Wide

Whatever your plant's power transmission design problem, wherever you are, your nearby Gates Distributor or Field Representative is ready to assist you to cut space, weight, and costs with Super HC. Ask him for a copy of *"The Modern Way to Design Multiple V-Belt Drives."*

TPA 463

The Gates Rubber Company, Denver, Colorado
Gates Rubber of Canada Ltd., Brantford, Ontario



Gates *World's Largest Maker of V-Belts*

Gates Super HC V-Belt Drives same hp capacity in smaller "package"

Why Missilemakers Stay Busy

Defense Debates Keep Heat on Aerospace Programs

Major aircraft and missilemakers on the West Coast have a $6.8 million backlog.

They'll get about half the $10 billion listed in 1960 and 1961 budgets for aircraft and missiles.—By R. R. Kay.

■ Farwest aircraft and missile makers are having one of their best years.

The industry manages to take layoffs, cutbacks, and cancellations in stride. And it remains the area's largest single factory employer. Paychecks go out to 360,000 persons.

Pressure Stays On—Here are the reasons why the industry is busy:

Major aircraft - missilemakers have a $6.8 million backlog.

The defense row is getting hotter daily. Persons in and out of the Administration are taking shots at its military program.

It's a presidential election year. Democrats are making hay with the missile lag.

Congress is now in session. Democratic presidential hopefuls will keep up pressure for more defense funds.

Half of the Total—Over $10 billion is earmarked for aircraft and missiles in the fiscal 1960 and 1961 budgets. And the Coast's aerospace companies are in for one-half of this amount. California alone gets 22 pct of the military dollar.

No matter how the defense row comes out, the aircraft-missile companies on the Coast will do well. So will the Farwest's economy.

Missile business is looking up. The industry foresees a 10 pct hike in sales and a small employment increase. Many missile programs will get into fuller production during the year.

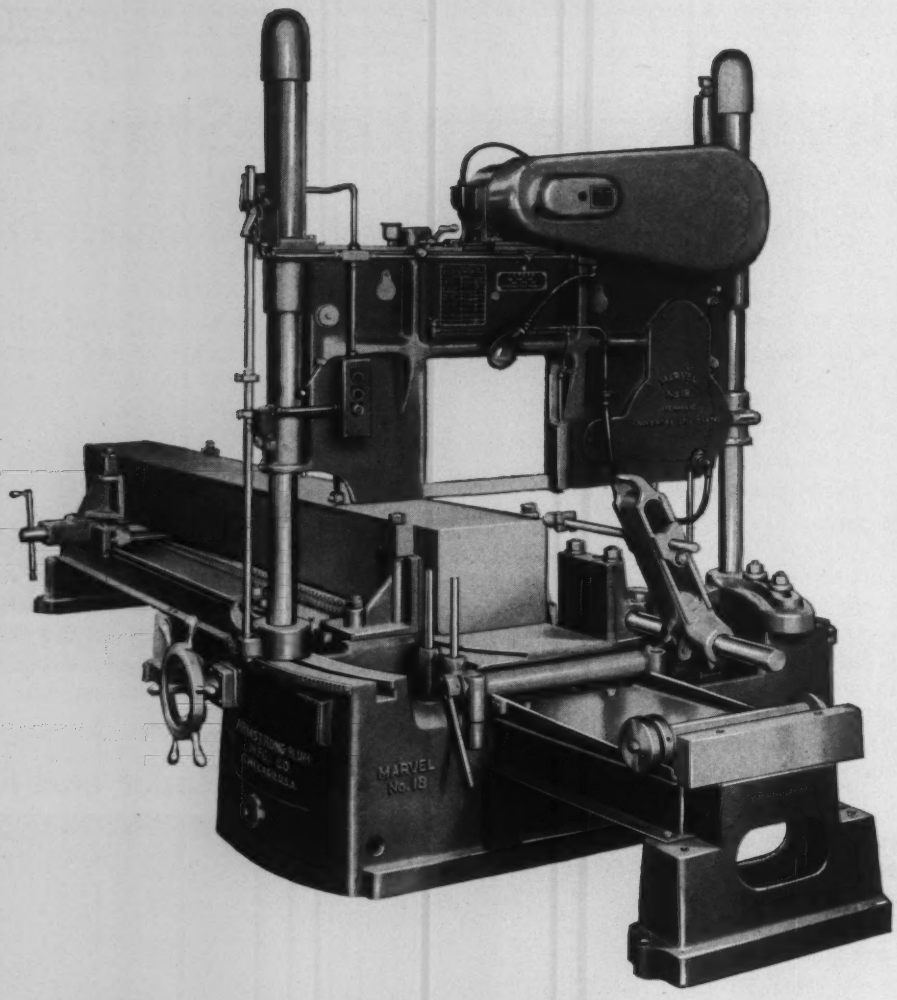
More Rocket Motors — Something new has been added to southern California's economy. A big part of the liquid and solid propellant rocket motors used in today's missiles are made there. Employment in the propulsion industry now is 10,000 persons. And it's sure to rise this year and next.

Ground support equipment is also big business on the Coast. Making of test, checkout, handling, and launch gear is rolling along at good speed.

Skilled Work Force—Pentagon planners say the Federal space budget will soon be $1 billion. The skills needed to make space vehicles are about the same as those used in aircraft-missilemaking. So it's a solid bet that the Coast's defense industry will get a fair share of this business, too.

All Ready for Radar and Radome

PRE-FINAL ASSEMBLY: Yawning opening in nose section of Lockheed Electra will be closed by installation of radome after radio scanner is attached. Then prop-jet's nose and fuselage (in rear) will be "airlifted" by overhead cranes to final production line.



No Job too big or too tough . . .

for MARVEL "*Giant*" Hack Saws

These giant MARVEL Hydraulic Hack Saws (No. 18, Capacity 18" x 18"; and No. 24, Capacity 24" x 24") were *basically* designed for rapid and economical cut-off of BIG WORK. They are not merely "conventional" designs "stretched" to big capacity. They are truly designed and built with the ruggedness and rigidity necessary to withstand the rough treatment of sawing big work, even though the work is in the "toughest of the tough" alloys.

They are reliably fulfilling the cut-off requirements in innumerable steel mills, forge shops, structural shops, warehouses, and machine shops, with assured low tool cost and minimum kerf loss of steel.

In addition to cutting-off, they are reducing costs by eliminating further machining operations. Heat treated die blocks are being reclaimed for re-sinking by sawing off the worn face; columns, beams, pipe, and tubing are being sawed to *finished*, square ends, eliminating milling; angular sawing is done conveniently by swinging the upper structure on the base, to any angle up to 45 degrees—*without moving the work*.

Contemplating the modern trend toward ever tougher steels and larger sizes, these are the logical sawing machines to buy, not only for today's needs but for tomorrow's as well.

MMT-PE

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MARVEL *Metal Cutting* SAWS
Better Machines-Better Blades

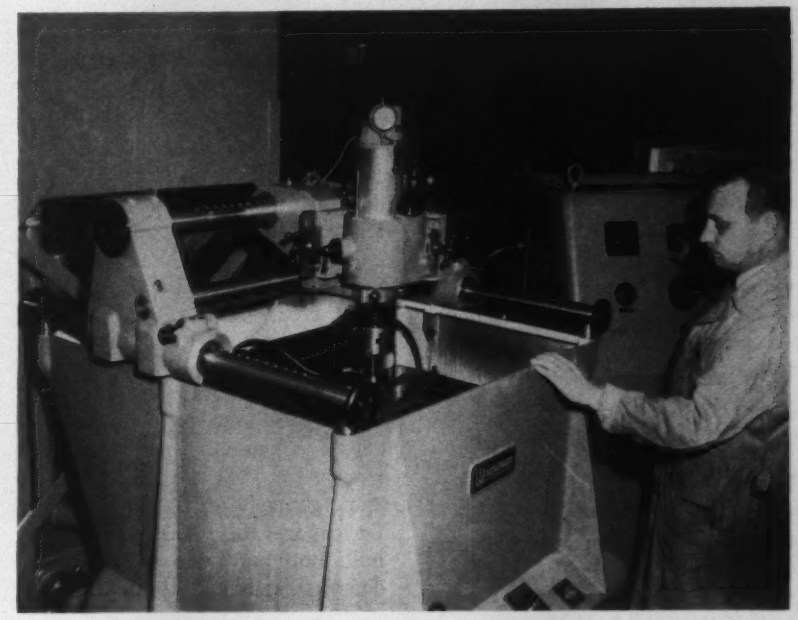
ARMSTRONG-BLUM MFG. CO. 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.

British Advance Spark Machining

They Offer New, Low-Cost Unit to Speed Work

Equipment for spark erosion machining has been simplified. It consists of three units.

Quality forging dies have been made at a savings of 75 pct when compared with conventional methods. — By R. H. Eshelman.



SPARK MACHINING DIES: British unit handles die blocks 28 x 16 x 15 in. It offers fast metal removal rates, up to 400 cu mm per minute.

▪ Steady progress is being made in the field of electro-discharge machining. Units now on the market are taking on more jobs than those first seen for the method.

Last summer, electro-discharge machines were featured in the Russian industrial exhibit in the New York Coliseum. The equipment was sound and metal removal rates high.

Now a British firm, Wickman of Coventry, England—a licensee of Firth-Sterling (Method X)—unveils some eye-opening equipment for spark erosion machining. They're holding private demonstrations at LeMaire Tool & Mfg. in the Detroit area. U. S. auto production executives are said to be impressed with what the machines can do on forging dies.

Simplify Unit—Makers of electro-discharge equipment use different trade names for their units and can point to differences between processes. Wickman calls its process simply spark machining. It has tried to simplify the equipment and take the mystery out of its use. To do it, the equipment was set up in three practical units.

One is the machine tool itself. This holds the electrode or tool, and the work. A second is a cabinet with the electronic circuitry. The third unit is the supply and purging tanks for the dielectric—liquid paraffin. For a production installation this is sensible.

If improvements in electronics come along you simply remove the old black box (spark generator) and substitute the new and better one. Also, several large machines can use a common liquid supply.

Slashes Work Cost—Economics of spark machining of forging dies is most interesting. Not only can you get much closer tolerances than conventionally, but you get dies, such as for connecting rods or crankshafts, at savings up to 75 pct. This is at British labor rates. With U. S. labor costs, payoff might be even more.

The data cited is far from theoretical. British Motor Corp. is using a group of the machines.

In addition to the large die machine, the British tool builder has three other spark erosion units. There's a small bench model for carbide dies, etc.; a universal machine with range of electrode movements suitable for tool-room use; and a larger, self-contained model for production work.

Lower Initial Cost—The successful British technique on forging dies and other work-pieces needing a fine finish is to use up to five electrodes with varying metal removal rates. On a pair of connecting rod dies this was cut from 50 to 17 hours.

Capital outlay for these machines is relatively low. Arrangements are being made to market the line through American distributors.

INDUSTRIAL BRIEFS

More Aluminum Sheet—A $5.5 million program to integrate aluminum production is being undertaken by Scovill Mfg. Co., Waterbury, Conn. This program is expected to double Scovill's present output of aluminum sheet. It will take about 2 years to complete. New equipment will be set up in the Waterbury area formerly occupied by the Scovill Tube Mill.

Establish New Awards — Three new ASM Metal Awards have been established by the Trustees of the American Society for Metals. Two awards will be given in honor of the late W. H. Eisenman, a founder member and the Society's national secretary for 40 years. The third is in the name of the late Dr. M. A. Grossmann, a past president.

Golden Anniversary — Eastern Tool & Mfg. Co., Belleville, N. J., is celebrating its 50th anniversary this year. The company specializes in volume production of small and medium-sized wire forms, metal stamping and deep drawing and was founded in Newark, N. J. in 1910. C. E. Peterson, president, is the last surviving member of the four original founders.

Joining Forces — McKay Machine Co., Youngstown, O., has agreed to serve as sales representative to the metalworking industry for Wean Equipment Corp., Cleveland. The agreement is aimed toward consolidation of the companies for greater sales efforts and better customer relations.

Master Power Plans — A 14-acre tract of land on Cochran Rd., Solon, O., has been purchased for new manufacturing facilities for the Master Power Corp., subsidiary of The Black & Decker Mfg. Co. Contracts have been let to The Austin Co., Cleveland, for construction of the air tool plant. The entire project will cost about $700,000.

Safety Pays — President Eisenhower has invited Fred Gordon, Iroquois Steel & Iron Co., Chicago, and Samuel Fagin, Chapin & Fagin Inc., Buffalo, to attend the President's Conference on Occupational Safety. Messrs. Gordon and Fagin are chairman and vice chairman, respectively, of the Committee on Safety of the Institute of Scrap Iron & Steel Inc.

Shake, Rattle and Roll—Hewitt-Robins Inc., Stamford, Conn., is adding a new railroad car shakeout to its line of material handling equipment. The machine is called the H-R Trackside. It is designed for unloading 1-10 hopper cars per day of coal, aggregates, and ores. Cost is $3450, including all electrical components.

Double Coated Sheets—Aluminum Co. of America plans to double its capacity for enamel-coated aluminum sheet. Immediately, Alcoa will construct two new "paint lines" in buildings of its Davenport, Ia., sheet and plate mill. Both units are scheduled for completion in late 1960.

Rights to Works — The Illinois Tool Works, Chicago, purchased all manufacturing rights for the U. S. and Canada to the electronic module and capacitor components developed by ACF Industries, Inc. Included in the purchase was the Alexandria, Va. facility. ACF will retain foreign marketing rights.

"That was a very good question!"

Die Casting Service—New facilities and services for rebuilding and modernizing die casting machines are now being offered by Mr. Joseph Kaul through his new company. It is known as Die Cast Machinery Inc., located at 409 Earl St., Toledo 5, O. Mr. Kaul, was formerly chief equipment engineer of Doehler Jarvis Co.

Win Hunt Medal—The Robert W. Hunt Medal of the Metallurgical Society, American Institute of Mining, Metallurgical & Petroleum Engineers has been awarded to three Jones & Laughlin Steel Corp.'s employees. It is for their paper on blast furnace operations. The J&L men are: Dr. T. E. Dancy, A. T. Sadler and Dr. H. N. Lander.

Center Site — Bendix Aviation Corp. has acquired an 80 acre site in the San Fernando Valley for a new electronics center. The facility is for the development of military and industrial electronic systems. The first building is expected to be occupied early in 1961.

Can't Nail It Down—A building designed for research in mine detecting has been developed by the U. S. Army Engineer Research & Development Laboratories in Fort Belvoir, Va. It is equipped with up-to-date electronic instruments to aid improved mine detection. No nails or metal parts were used in the construction.

Power-Packed Line — Duff-Norton Co., Pittsburgh, is offering a new line of heavy-duty hydraulic rams and independent pumps with attachments and accessories. The Ram-Pac line provides power to apply from 10 to 100 tons of force in any direction. They can be used as permanent installations in hydraulic jigs, fixtures or presses.

Passing The Plate—Mesta Machine Co., Pittsburgh, will design and manufacture the first plate mill installation to operate as either a 160″ mill or a 210″ mill. It will be installed at the Gary Steel Works of U. S. Steel Corp.

How are they doing down on the farm?

Nowadays they're doing everything a lot easier, thanks to modern power-operated farm machinery.

And farm machinery producers have learned that their lot can be a lot easier, too, when they specify Ostuco Tubing. That's because there's no compromising with custom-quality Ostuco Tubing. Consistently you receive the exact tubing you want — the size, length, grade — with the strength and tolerances you need. For machined parts, you get our recommended rough size guaranteed to clean up.

In addition to these advantages, Ohio Seamless will fabricate tubular parts to your specification. Contact your nearest Ohio Seamless representative, or send part drawings to the plant at Shelby, Ohio—Birthplace of the Seamless Steel Tube Industry in America.

A-1358A

Complimentary Copy of new Bulletin CS60 "Ostuco Steel Tubing" sent on request.

Model illustrated built to 3.5 mm scale.

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Division of Copperweld Steel Company • SHELBY, OHIO

Seamless and Electric Resistance Welded Steel Tubing • Fabricating and Forging

SALES OFFICES: Birmingham, Chattanooga, Chicago (Oak Park), Cleveland, Dayton, Denver, Detroit (Huntington Woods), Houston, Los Angeles (Commerce), Miami, Moline, New Orleans (Chalmette), New York, North Kansas City, Philadelphia (Wynnewood), Pittsburgh, Rochester, St. Louis, St. Paul, Salt Lake City, Seattle, Tulsa, Wichita

EXPORT: Copperweld Steel International Company, 225 Broadway, New York 7, New York

Can you get longer edge life from your SLITTER KNIVES?

A·S·K for the answer!

AMERICAN SHEAR KNIFE

The answer is yes when you use slitter knives from A.S.K. (American Shear Knife Company). A.S.K. Slitter Knives last longer, stand up better under the heaviest jobs, reduce maintenance and replacement costs!

Why? Because A.S.K. has devoted years of research to the selection of proper alloys, and correct techniques in heat treating, precision grinding. For slitter knives that last longer, improve your slitting operation . . . Ask A.S.K.!

FREE HANDBOOK—Want a handy reference on the installation, operation and maintenance of slitter, shear and chipper knives? A.S.K. has the answers in an 88-page manual. For free copy, write American Shear Knife Co., Homestead, Pa.

J. G. Anderson, appointed vice president, government relations, Stromberg-Carlson, Div. of General Dynamics Corp.

The Canada Metals Co., Ltd.—**Carleton Smith,** elected president.

Cal-Metal Pipe Corp.—**K. S. Bayless,** appointed vice president, sales.

Stromberg-Carlson, Div. of General Dynamics Corp.—**Edward Diamond,** promoted to vice president and counsel.

The Tool Steel Gear & Pinion Co.—**H. S. Mercier,** appointed vice president, sales; **R. L. McGrath,** named general sales manager.

Jessop Steel Co., Steel Warehousing Div.—**M. D. Hine,** named controller, Broadview, Ill.

Jones & Laughlin Steel Corp., Steel Works Div.—**F. D. Delve,** appointed supervisor, Metallurgical Dept., Pittsburgh Works.

American Steel & Wire Div., U. S. Steel Corp.—**H. C. Ness,** appointed director, cost and statistics; **L. D. Van der Veer,** named asst. director, Accounting Dept.

Hagan Chemicals & Controls, Inc., Controls Div.—**H. R. Leming,** named asst. manager, proposal engineering.

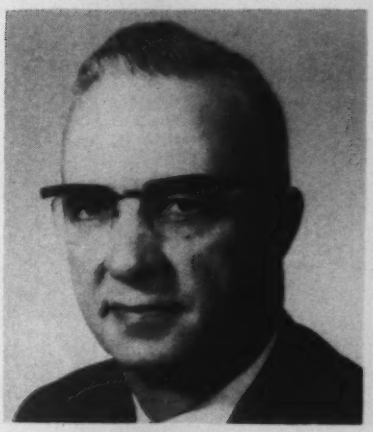
Olin Mathieson Chemical Corp.—**P. H. Kaskell,** appointed senior counsel, metals.

General Electric Co.—**H. C. Potter,** appointed manager, sales, Semi-Conductor Products Dept., Syracuse, N. Y.

Alcoa International, Inc.—**C. I. Hill,** appointed asst. sales manager.

The Lincoln Electric Co.—**G. N. Bull,** named district manager, Florida sales engineering district; **R. S. Hale,** named district manager, Boston engineering district.

International Business Machines Corp., Federal Systems Div.—**H. S. Sheriff,** promoted to procurement manager.



L. S. Campbell, appointed vice president, Michigan Limestone, Div. of U. S. Steel Corp.

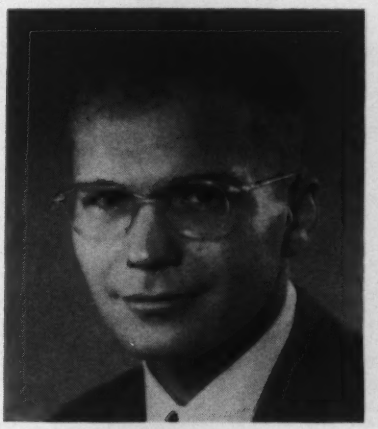
Denison Engineering Div., American Brake Shoe Co.—**D. J. Arnold,** named north central regional manager.

Rockwell Mfg. Co., Walker-Turner Div.—**George Wulff,** named regional sales manager, California, Nevada and Arizona.

U. S. Steel Corp., Slabbing and Plate Div.—**B. M. Hughey,** appointed division superintendent, Homestead district works; **J. V. Dorman,** appointed asst. to general

(Continued on P. 82)

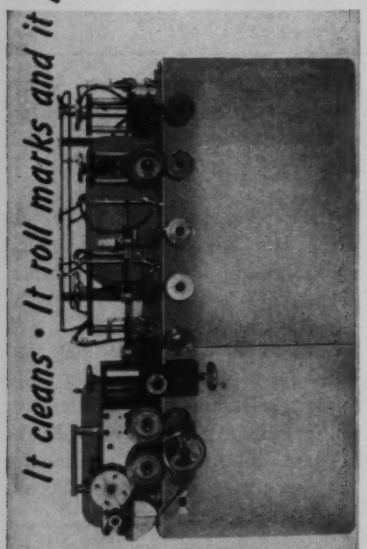
T. A. Wheeler, elected vice president, planning, Allegheny Ludlum Steel Corp., Pittsburgh.



W. A. Kirkpatrick, elected controller, Allegheny Ludlum Steel Corp., Pittsburgh.

H. L. Buck, elected executive vice president, I-T-E Circuit Breaker Co., Philadelphia.

MATTHEWS HIGH SPEED SURFACE CONDITIONER MACHINE



It cleans • It roll marks and it prints • all within your production line.

The unit illustrated removes drawing compounds and grease from the surface of tubing so a good clean mark can be printed; while 180° opposite the printed mark a controlled depth indented mark is applied. For bars and tubes from ¼" to 6" dia. adjustable for speeds to 1000 ft. per minute.

JAS. H. MATTHEWS & CO.
3962 Forbes Ave. • Pittsburgh 13, Pa.
Offices in Principal Cities

(Continued from P. 81)

superintendent, Gary Steel Works; **W. W. Gosnell,** named asst. division superintendent; **O. O. Nelson,** becomes superintendent, 100 in. plate mill, and **F. W. Stanford,** becomes asst. superintendent, 100 in. mill.

A. E. MacKenzie, elected vice president, power equipment, I-T-E Circuit Breaker Co., Philadelphia.

Reynolds Metals Co. — **H. C. Willms,** promoted to manager, Jones Mills, Ark., reduction plant; **W. E. Campbell,** promoted to asst. manager, Troutdale, Ore., reduction plant.

Minneapolis-Honeywell Regulator Co., Valve Div.—**J. W. Hughes,** appointed sales manager, Fort Washington, Pa., and **C. D. McIntire,** named industrial manager, Midwest region, Chicago.

J. H. Schellman, named president, Control Switch Div., Controls Co. of America.

R. R. Wagstaff, elected engineering vice president and a director, United Engineers & Constructors Inc., Philadelphia.

Republic Steel Corp. — **C. K. Pickering,** appointed asst. superintendent, Electrical Dept., Canton, O., steel plant.

A. M. Byers Co.—**N. J. Connors,** promoted to Pittsburgh district sales manager; **M. M. Jenkins,** named asst. to the manager, steel sales.

J. T. Pinkston, elected a vice president, United Engineers & Constructors Inc., Philadelphia.

Denison Engineering Div., American Brake Shoe Co.—**E. W. Cummings,** named field engineer.

The Yale & Towne Mfg. Co., Yale Materials Handling Div.—**R. G. Ochsner,** appointed director, materials; **Leo Postrel,** appointed ma-

(Continued on P. 84)

NEW 5"-10" BENDING ROLLS ...produce cylinders with work-saving ease and cost-cutting speed

Model 5-60 (5" x 60")

Model 10-120 (10" x 120")

NIAGARA

Sleek, massive and low-built, these modern machines form commercially true cylinders with utmost speed and operating ease.

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- **Full length, emergency stop treadle**
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- **Air operated drop end for easy removal of cylinders**
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- **Rear roll power adjusted, with indicators to duplicate settings**
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- **High torque main drive motor with magnetic brake and reversing control**
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Chicago Malleable Castings Co., Chicago 43
Moline Malleable Iron Co., St. Charles
National Mall. and Steel Castings Co., Cicero 50
Peoria Malleable Castings Co., Peoria 1
Wagner Castings Company, Decatur

INDIANA
Link-Belt Company, Indianapolis 6
National Mall. & Steel Castings Co., Indianapolis 22

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Iowa Malleable Iron Co., Fairfield

MASSACHUSETTS
Belcher Malleable Iron Co., Easton

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Albion Malleable Iron Co., Albion
Auto Specialties Mfg. Co., Saint Joseph
Cadillac Malleable Iron Co., Cadillac
Central Fdry. Div., Gen. Motors, Saginaw

MINNESOTA
Northern Malleable Iron Co., St. Paul 6

MISSISSIPPI
Mississippi Malleable Iron Co., Meridian

NEW HAMPSHIRE
Laconia Malleable Iron Co., Laconia

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Frazer & Jones Company Division
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Oriskany Malleable Iron Co., Inc., Oriskany
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OHIO
American Malleable Castings Co., Marion
Central Fdry. Div., Gen. Motors, Defiance
Dayton Mall. Iron Co., Ironton Div., Ironton
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Maumee Malleable Castings Co., Toledo 5
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Lancaster Malleable Castings Co., Lancaster
Lehigh Foundries Company, Easton
Meadville Malleable Iron Co., Meadville
Pennsylvania Malleable Iron Corp., Lancaster

TEXAS
Texas Foundries, Inc., Lufkin

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West Virginia Mall. Iron Co., Point Pleasant

WISCONSIN
Belle City Malleable Iron Co., Racine
Chain Belt Company, Milwaukee 1
Federal Malleable Company, Inc., West Allis 14
Kirsh Foundry Inc., Beaver Dam
Lakeside Malleable Castings Co., Racine
Milwaukee Malleable & Grey Iron Works, Milwaukee 46

These companies are members of the Malleable Castings Council

(Continued from P. 82)

terials administrator; **C. W. Fielding,** appointed manager, Material Control Dept., Philadelphia plant; **T. W. Curtin,** appointed purchasing agent, Purchasing Dept., Philadelphia plant.

Armco Steel Corp.—**W. L. Sandston,** promoted to supervisor, economic research.

Armco Steel Corp.—**R. S. Hayden,** appointed asst. treasurer and general insurance manager.

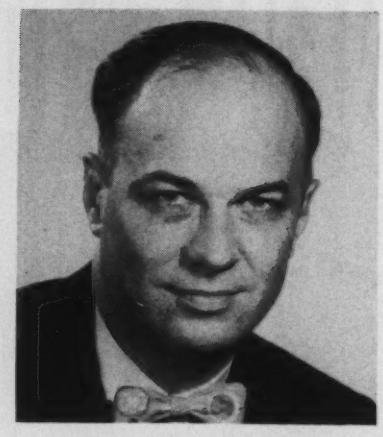
Abell-Howe Co.—**R. H. Cronwell** appointed marketing director.

Taft-Peirce Mfg. Co. — **J. G. Zeiger,** named director, marketing.

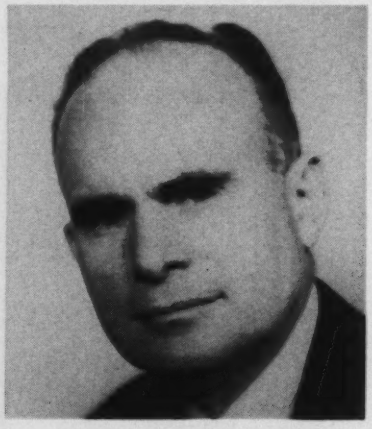
Vickers Inc., Aero Hydraulics Div.—**E. D. Rumford,** appointed application engineer.

G. L. Schuster, appointed president, Timesavers, Inc., Minneapolis.

R. M. McGugin, elected secretary, Brad Foote Gear Works, Inc., Chicago.



Dr. W. R. Hibbard, Jr., appointed manager, Metallurgy and Ceramics Research Dept., General Electric Research Laboratory, Schenectady.



A. A. Hendrix, appointed manager, AC Spark Plug Div. operations in Milwaukee, General Motors Corp.

OBITUARIES

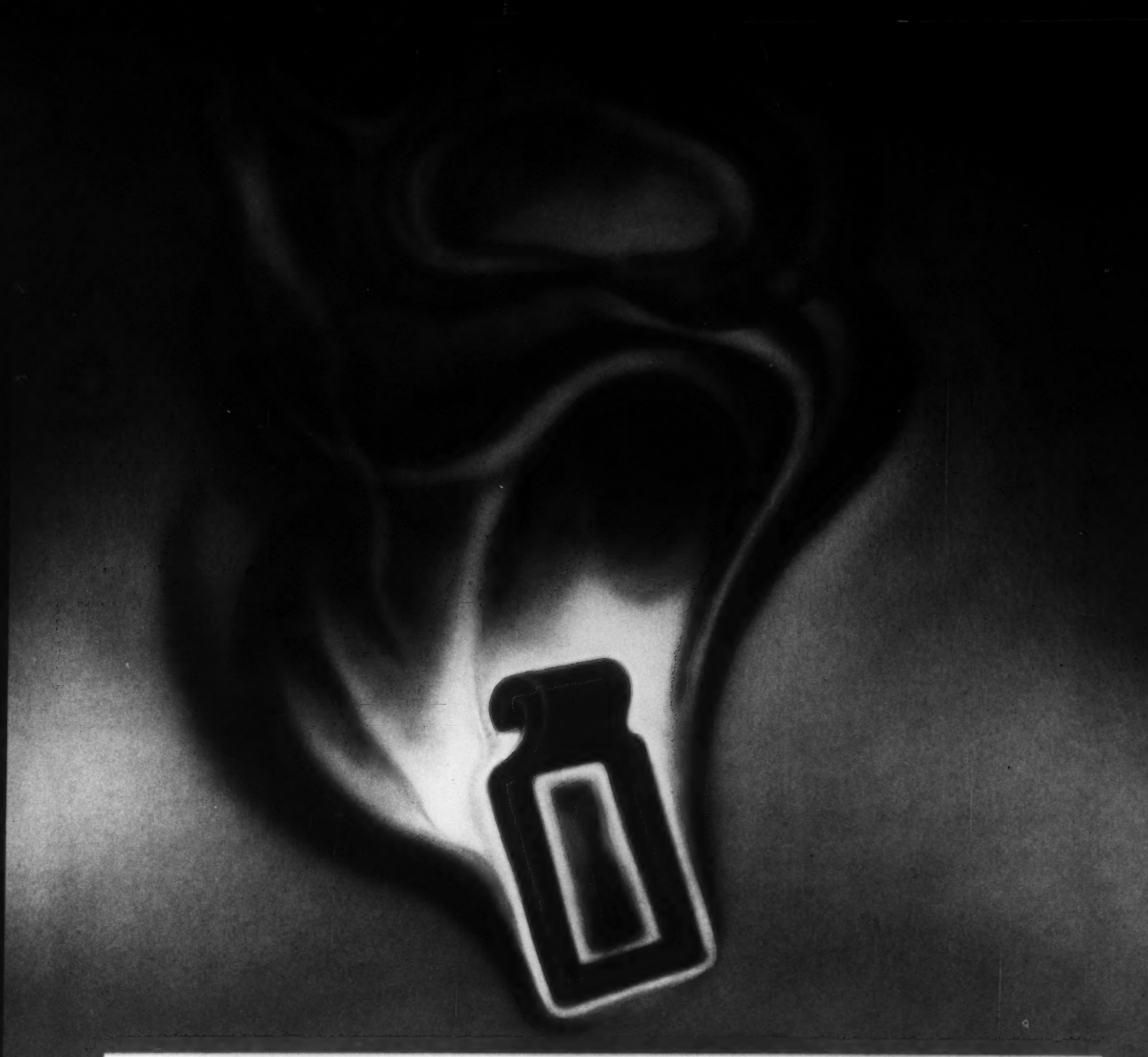
Henry Marx, 101, former president and chairman of the board, The G. A. Gray Co., Cincinnati.

Harry Pelphrey, director, research, Michigan Tool Co., Detroit.

W. E. Rogers, 73, formerly asst. secretary and general sales manager, The Taft-Peirce Mfg. Co., Woonsocket, R. I.

E. S. Underwood, 83, vice president and director, Metal Hydrides Inc.

W. C. Dunlap, 66, manager, purchasing, The New Jersey Zinc Co.



Schlieren photograph showing heated air rising from Malleable chain link at 1200° F.

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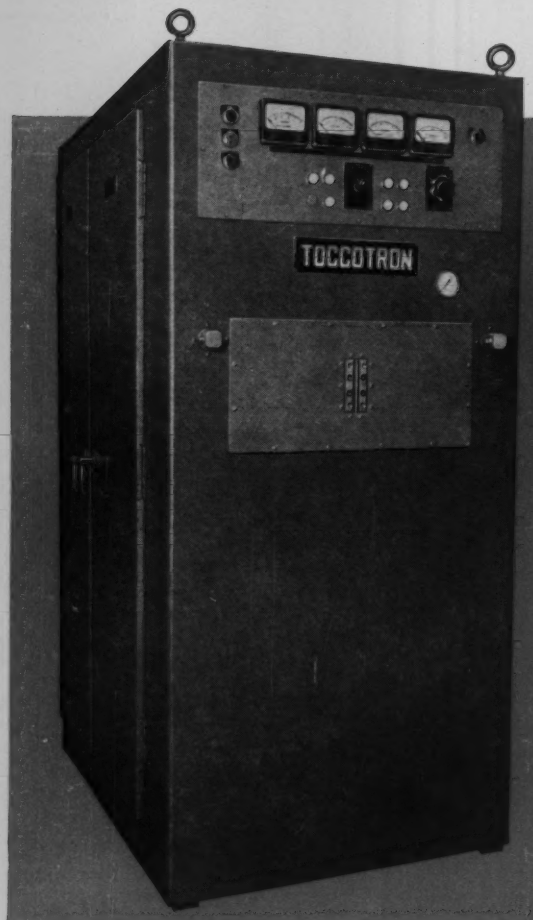

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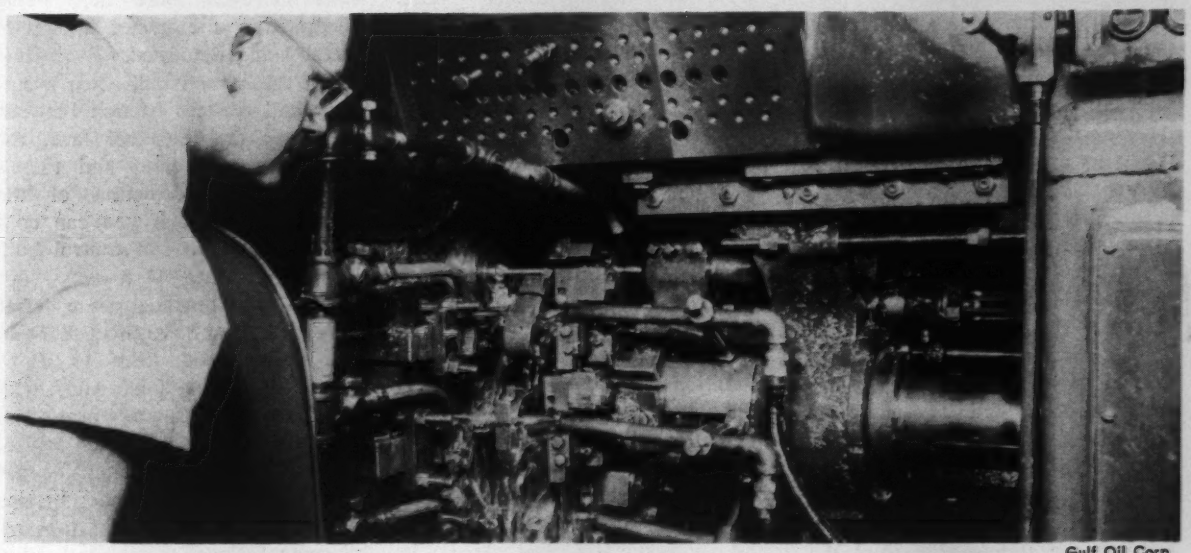


Gulf Oil Corp.

■ How to Get More for Your Cutting Fluids Dollar | **Section 1**

What Does a Cutting Fluid Do?

Shaping of metals by cutting is a complex business. All the conditions that go into it pose an ever-changing set of problems.

But, whatever the metal, machine, or type of cutting tool, there's bound to be heat. It's the cutting fluid's job to control it.

By J. J. Obrzut,
Technical Editor

■ Cutting tools fail for many reasons, but their worst enemy by far is heat. As metal is being cut, the cutting tool must first deform the metal ahead of it to form chips. This action exerts tremendous pressure on the tool point. It's estimated that 75 pct of all the heat generated in the cutting zone can be attributed to plastic deformation of the metal.

Sliding friction between the chips and the cutting tool's face is the second source of heat. It accounts for the remaining 25 pct. Combined, it's a destructive team of conditions that can lead to rapid tool failure. But, fortunately, it can be held in check.

Can't Avoid It—There's no way of avoiding plastic deformation of the metal. It's a condition of the cutting or shearing action that must be borne in any machining operation. And, likewise, just as long as there's a cutting tool involved,

No. 1 in 1960's
Metalworking Dollar Series

Cutting Oils and Coolants

This is the first of six special features in The IRON AGE's 1960 Metalworking Dollar Series. In the coming months, the editors of The IRON AGE will cover the following subjects.

April—	Numerical Controls
June—	Metallic Coatings
August—	Special Fasteners
October—	High-Strength Metals
December—	Special Machining Methods

metal chips will slide up over its face.

The life of the cutting tool is at the mercy of high temperatures. Neglect temperature, and the tool may last only a few minutes. Control it, and you can prolong its life for hours or days. In fact, temperature is so critical a factor that only a small drop can increase tool life by a large margin.

What Happens? — Whether it's the heat generated by plastic deformation of the metal or by friction, it must be controlled. A cutting fluid does this in two ways: (1) removing the heat from the cutting tool, chips and workpiece as quickly as possible, and (2) acting as a lubricant to reduce friction between the sliding chips and the cutting tool. Of course, the cutting fluid provides other benefits too.

How does a cutting fluid perform its job? How does it reach the area where the cutting tool is so intimate with the metal? Won't the cutting fluid break down under such conditions of extreme heat and pressure? Let's take a look at the mechanism of cutting.

Depends on Angle—As the tool tip "bites" into the metal, plastic flow ahead of the cutting edge occurs for the most part along a single plane. This plane, called the shear plane, extends from the tool's edge to the surface of the workpiece. It forms an angle with the plane in which the tool is traveling. This is the shear angle.

The shear angle is variable. Its size depends on many factors. But, if the shear angle is small, the shear plane will be relatively long and more metal must be deformed. This condition simply generates more heat.

On the other hand, if the shear angle is large, the shear plane will be relatively short. As such, there will be less deformation of metal and consequently less heat. It would be well, therefore, to keep the shear angle as large as possible and thereby reduce metal deformation to a minimum.

Friction Controls Angle—Interestingly enough, friction between the chip and the tool face controls the size of the shear angle. The more friction, the more heat will be generated, and the smaller will be the shear angle. This, in turn, results in even more heat being generated by the greater amount of metal being deformed.

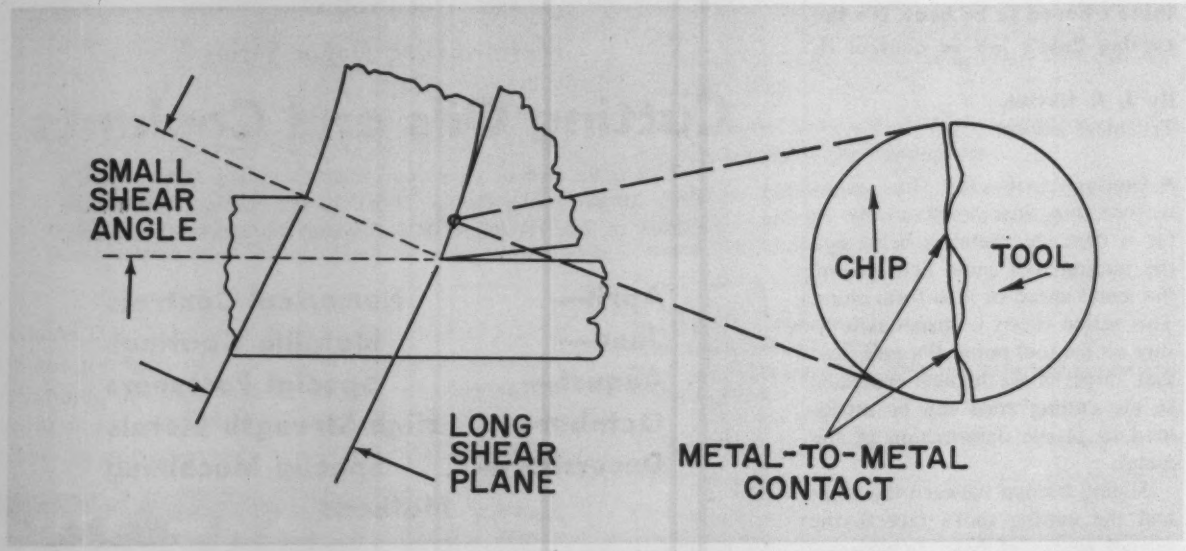
On the other hand, when a cutting fluid reduces friction between the chips and the tool face, the shear angle increases and there's less plastic deformation of the metal. Therefore, if you can control friction, you can control both sources of heat.

In a very practical sense, what does this mean? Simply this—that you require less force to do a given machining job. And, with less force required, you will use less power.

Tool life is longer, too. You not only save on tooling costs, but also on the valuable time for tool replacement. Superior surface finishes are another benefit. In short, it costs you less to produce better products.

How Fluid Works — A cutting fluid must reach the chip-tool interface if it's to reduce friction. As the diagram shows, the tool and chip surfaces are not perfectly smooth. There's metal-to-metal contact at scattered high points of

How Friction Builds Up Chip Size . . .



SMALL SHEAR ANGLE: Friction at chip-tool interface reduces shear angle but forms a longer shear plane. Tool must overcome resistance of plastic deformation, building up additional heat in process.

the chip-tool interface, leaving a network of tiny capillaries through which the cutting fluid can penetrate.

Just any fluid won't do. It will not withstand the high pressures and temperatures at the chip-tool interface. The fluid should contain ingredients that will react chemically with the chip to form a metallic solid lubricant or, in the case of fatty acids, a metal soap.

The thin film thus formed separates the chip from the tool. Being of low shear strength, the film offers far less resistance than would be encountered by the contacting metal surfaces of chip and tool.

Cincinnati Milling Products Div.

TWO PROCESSES: Microscope shows two elements that produce heat. One is the friction of chip on tool. Metal deformation is the other.

Reacts Quickly—The conditions of cutting are conducive to fast chemical reaction. First, the fresh metal of the chip surface is clean. It's at elevated temperature. It's also under heavy pressure. And, the metal is severely strained. All of these factors make the metal highly reactive with the additives in the cutting fluid.

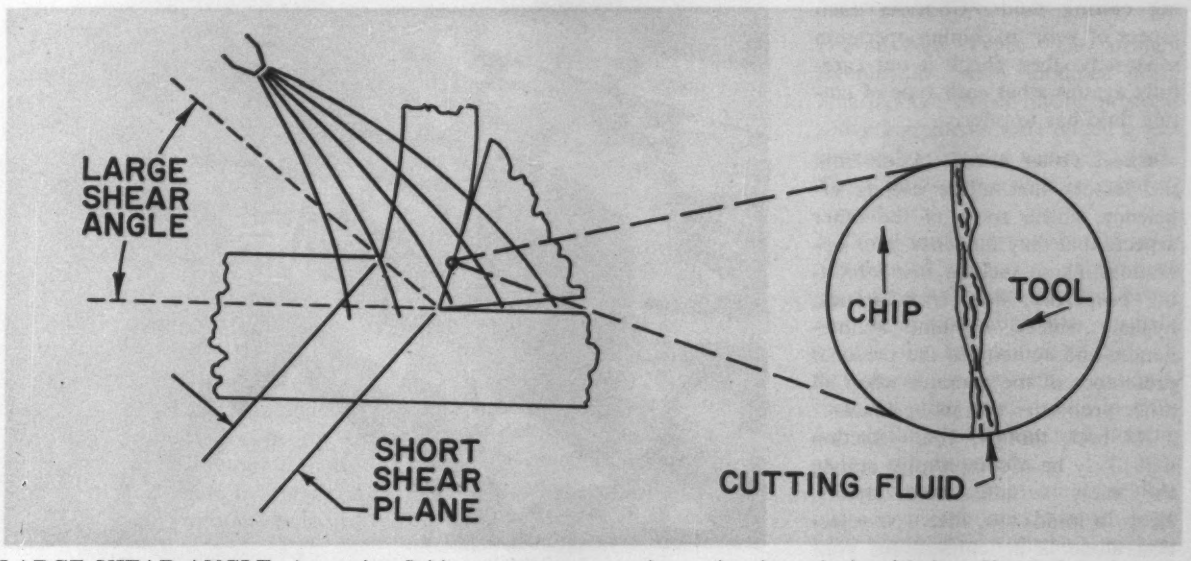
Among the cutting-fluid additives which are most effective in reducing friction are sulphur, chlorine, phosphorus and free fatty acids. The oil or water is simply a conveyor for the chemically active additives.

Stable iron sulphides have an average shear strength of only half that of iron. The average shear strength of iron chlorides is less than one-third that of iron. At slow cutting speeds where the temperature is low at the chip-tool interface, chlorinated fluids do a better job of reducing friction than the sulphurized fluids.

Tables Turn—Because the iron sulphides have a higher melting point than the chlorides, they become more effective as machining speeds and feeds go up.

A metallic phosphate film has a shear strength of about 20 pct that of iron. It's about the same as that of a metal soap film. However, a soap film has a low melting point and won't hold up as well as the metallic solid lubricants under heavy pressure, high temperature.

How Tool Rides Over Solid Film



LARGE SHEAR ANGLE: As cutting fluid penetrates to chip-tool interface, a metallic solid lubricant coats surfaces, thereby reducing friction. Shear plane is now smaller and heat of metal deformation less.

Match Cutting Fluid to the Job

There's a lot at stake in making the right decision about the cutting fluid you use.

Know your needs, then compromise on the best set of properties.

■ Selection of a proper cutting fluid is no simple matter. Too many factors enter into a decision to simply set down some blanket rules. The cutting tool, depth of cut, type of operation, feeds, speeds, the machine, desired accuracy—all have a bearing on selection.

Each job should be considered on its own merits. Even steels of identical analysis may differ from heat to heat in their machinability. Factors such as the human element, or a change in the make or model of a machine, may require a change in thinking.

With new machines, new alloys and new tooling coming along in ever increasing numbers, it becomes that much more important to keep yourself flexible in selecting and using cutting fluids. Consider each aspect of your machining operation separately, then check it out carefully against what each type of cutting fluid has to offer.

Check Other Areas—Aside from the factors that affect cutting efficiency, check some of the other aspects that may influence your operation. These include rust inhibiting properties, fluid transparency, hygiene, safety, machine maintenance, and sometimes the personal preference of the operator when all other properties are about equal.

At best, though, your selection will likely be a compromise among the many variables and factors. Keep in mind, too, that wise selection alone is no cure-all for your machining problems. But your chances of getting a proper balance of the most effective properties is to your advantage.

Two Basic Types—Cutting fluids can be divided generally into two major groups—the oil base and water base.

The first group consists of mineral oils, sometimes used as straight cutting oils for light machining on nonferrous metals. But more often, they are used for blending with concentrated base oils which provide specific combinations of properties.

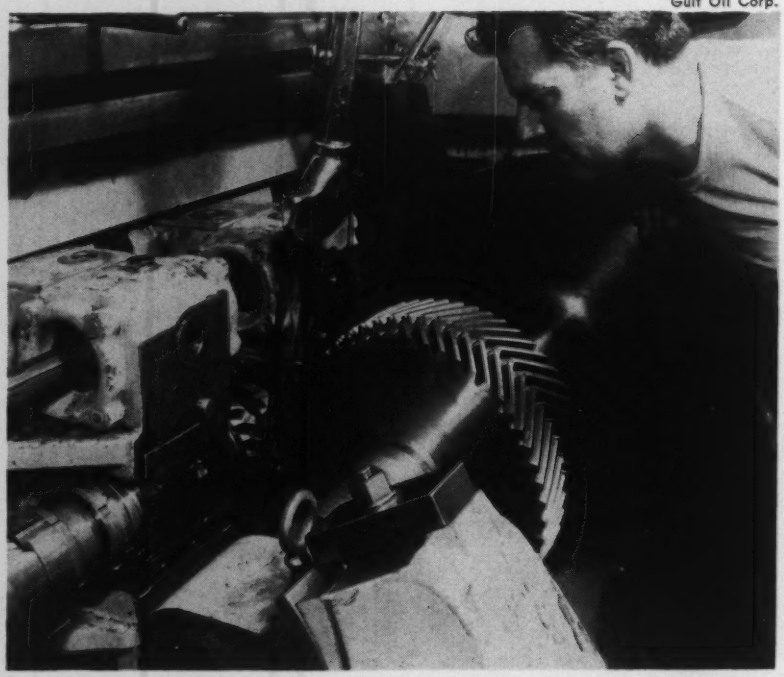
Of the fatty oils, lard oil, for example, is frequently used for blending with straight mineral oils. It imparts to the mineral oils the ability to spread and penetrate, and to form a film stronger than that of a straight mineral oil.

In blending, as much as 40 pct of the mixture may be fatty oils, depending on the machining characteristics that are required. Because of their tendency to give a good surface finish, they're often used for automatic screw machine operations where the conditions aren't too severe but smoothness and precision are needed.

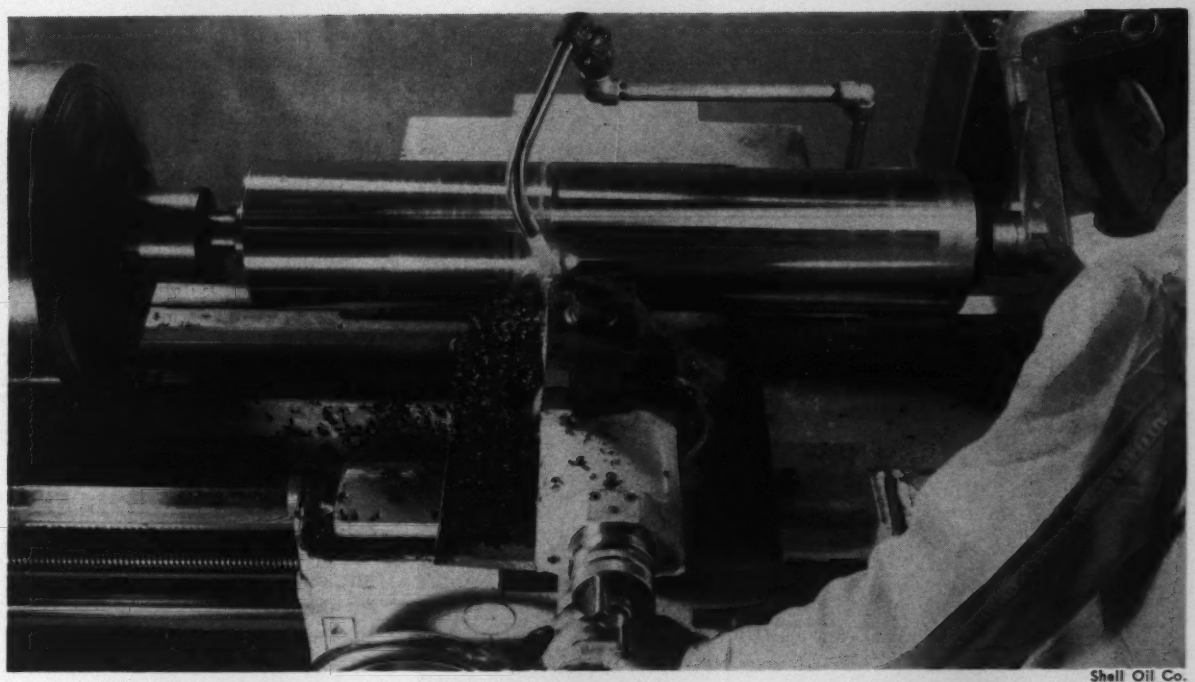
Aids Film Strength — Sulphur added to mineral oils improves their film strength. This increases their lubricating qualities and reduces the tendency of the chip welding to the tool tip. As such, the sulphurized-mineral oils are particularly effective for heavy machining operations as on tough alloys with high ductility.

Chlorinated-mineral oils likewise have very good anti-weld properties. They reduce friction very effectively where cutting speeds and temperatures are low. Their chief uses are for soft, ductile metals and some

Gulf Oil Corp.



HOLDS TOLERANCES: Sulphurized-mineral oil cutting fluid keeps expansion of tool and gear in check. Oil gives gear a smooth finish.



Shell Oil Co.

CUTS STAINLESS: Carbide tip bites into work at high machining speed. A soluble oil, diluted 20:1 with water, keeps work cool and leaves a bright, smooth finish on stainless steel. Cutting speed is 500 sfpm.

machining operations on stainless steels.

Sulphurized - fatty - mineral oils perform very well on nonferrous materials and can take heavy cutting pressures. They're effective, too, for reducing tool vibration. They stain less than the sulphurized-mineral oils and have good lubricity.

Chlorine Extends Range—Chlorine in sulpho-chlorinated-mineral oils gives these oils good anti-weld properties over a wide temperature range. They bear very well under pressure and retard build-up on the tool edge. The addition of fatty oil to this combination makes a suitable cutting fluid for a wide variety of heavy machining jobs.

Sulphur, chlorine and other additives normally tend to darken cutting oils. Some heavily compounded oils, in fact, are dark brown to black in color. Heretofore, transparency was difficult to obtain in these cutting oils without sacrificing their cutting efficiency. More recently, transparent oils have been developed that approach the "black" oils in performance in broaching, threading and tapping operations.

The transparent oils not only give better visibility of the work while it's in progress, but cut the downtime for checking. Inspection, too, is easier since parts need not be washed in a solution.

Water Dissipates Heat—The second major group of cutting fluids is the so-called soluble oils. Conventional "soluble" oils are actually mineral oils to which are added soap or soap-like ingredients to make them miscible in water. Water - oil mixtures range from 100:1 to 5:1 ratios.

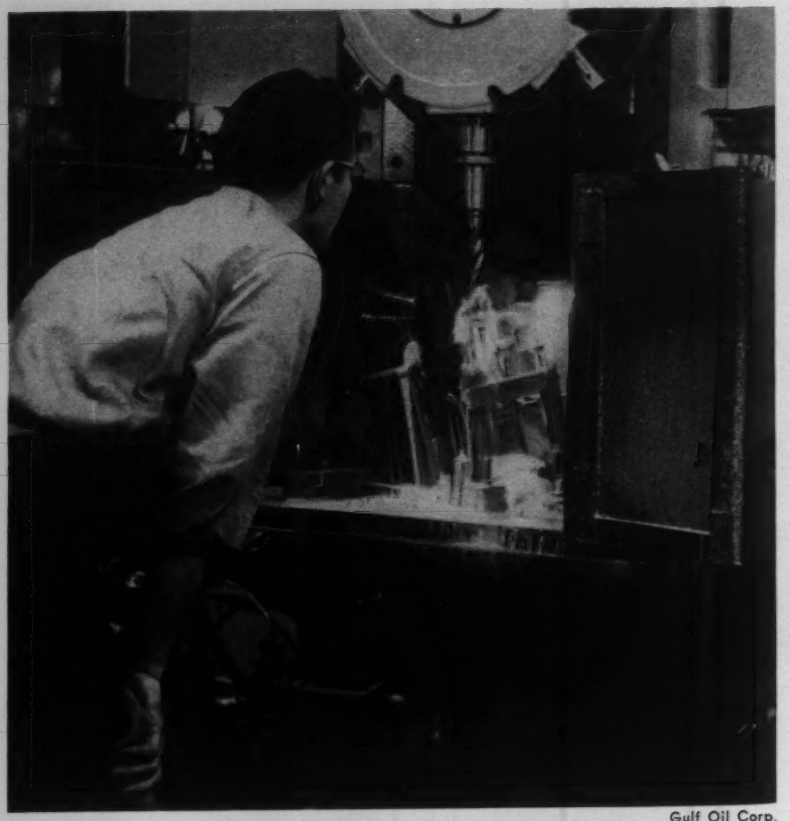
These emulsions provide a light friction-reducing film between the chip and face of the tool. They also afford some rust protection to freshly machined surfaces. But, their main function is that of conducting heat away rapidly from the cutting zone. Because of the combination of properties that these emulsions possess, they are used essentially where low and medium cutting pressures and high speeds are involved.

It's important to cutting efficiency that the emulsions remain stable in storage. The mixture should not separate, deteriorate, nor turn rancid. Bactericides are often added to afford some protection against bacterial growth.

Find New Types—The straight soluble oils were modified from time to time. Super-fatting or polar active ingredients were added to accommodate a wider variety of work. These fluids serve well in grinding operations.

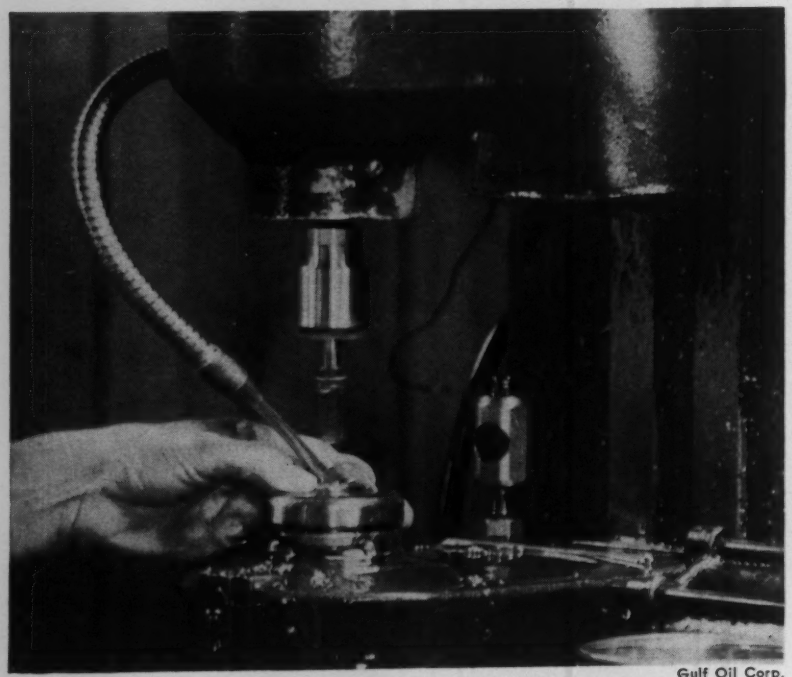
The detergent types contain large amounts of emulsifiers. They have good hard-water stability and better rust inhibition than the straight soluble oils. In addition to their effectiveness as grinding coolants, they also give good results in milling, drilling, threading and tapping at low cutting speeds.

There are a great many soluble oils now on the market which have been fortified to withstand extreme pressures. Called heavy-duty solubles, they have film strength char-



Gulf Oil Corp.

MUST BE EXACT: Using a sulphurized-mineral-lard cutting oil, machine taps aluminum sockets to close tolerances. Oil doesn't stain.



Gulf Oil Corp.

TOUGH CHORE: A heavy-duty soluble oil protects the drill and work in this tough cutting job. Piece is an alloy steel forging.

acteristics of highly compounded straight cutting oils. It's estimated that they're satisfactory for as much as 90 pct of all machining operations. They give excellent tool life, good finishes and perform well at the higher machining speeds and pressures.

Among the heavy-duty solubles are those with sulphur or chlorine additives, or a combination of both. The most popular, however, are the sulphur fatty concentrates.

Take Next Step — Synthetic or chemical coolants now combine with water to form a true solution. They're transparent, stable, have good film strength and prevent rust. They do not depend on oil for their lubricity, or on chlorine or sulphur for their load-carrying ability. For the most part, they result from nitrogen chemistry.

Early formulations were based on alkanol-amines. Later, highly polar substances were combined with nitrogen chemicals into stable water-soluble systems. Additives include sodium nitrite to prevent rusting, special inhibitors to protect brass from corrosion, and synthetic additives of high molecular weight to increase lubricity.

The small particle size of the make-up gives the synthetic coolants good stability. And, because there's nothing in the composition to promote bacterial growth, no additives are necessary to control it.

Make Good Team — The synthetic fluids that contain wetting agents exhibit excellent lubricity. Since they also rate high in cooling power, this combination of the important properties works well on the more rugged machining operations like broaching, threading, reaming, deep drilling and milling.

As more and more high-speed automatic machines come into use, the advantage of high lubricating value becomes increasingly important. This applies not only to the cutting tool and workpiece, but to the more expensive machinery which benefits from the lubrication afforded by these synthetics.

How Metals Influence Selection

Some metals are brittle; others ductile. Some are coarse-grained; others fine-grained.

Whatever the metal's characteristics, it will affect your choice of a cutting fluid.

■ Knowing the properties and characteristics of the material to be machined is mighty important in selecting a cutting fluid. To some degree, it will influence the economics, efficiency and quality of the job.

We know that much of the heat generated in cutting develops from the sliding of one metal particle against another when the tool tip exerts its heavy pressure on the material. As the particles rearrange themselves, the shape of the metal changes. We call this plastic flow.

Some metals flow less than others before rupture occurs. These have low shear strain. The chips are discontinuous or segmented, indicating that there's very little plastic flow before the chip splits off from the parent metal.

When the metal is brittle, you can expect discontinuous chips. Machining of such metals takes little power, the surface finish will be good, and you will get reasonably good tool life. However, if you start with a ductile metal and obtain a discontinuous chip, you'll get low tool life and poor surface finish.

Some Metals Drag — Ductile metals can be stressed in shear to a high level before they rupture. In fact, they often become highly deformed without failure, leaving one long, continuous chip. In such cases, the metal flows smoothly over the tool tip with little friction, giving good surface finish and long tool life.

A third type of chip is somewhat similar to that obtained when machining ductile metals under desirable conditions. However, where there's high friction between the chip and the tool, hardened fragments of metal tear away from the chip and build up on the tool tip. This condition is certainly undesirable since it gives a poor surface finish and shortens tool life.

What to Watch—The type of chip that's formed is governed by several factors. Some are mechanical, such as depth of cut, rake angle of the tool, speed, and feed. Others are physical and apply to the metal itself. These include (1) distribution and hardness of microconstituents, (2) work - hardening properties and (3) shear strength. The coefficient of friction between chip and tool, and the cutting fluid that's used are the other strong factors.

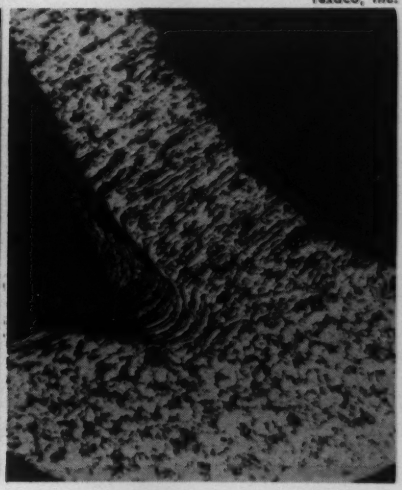
Effect of Grain Size—The ease or difficulty in machining a piece of metal is influenced to a large degree by grain size. Small, undistorted grains, such as those found in ductile metals, make machining

Chips Form in Three Distinct Types

Texaco, Inc.

BRITTLE: Chip from brittle metal ruptures easily, forms segments.

DUCTILE: Smooth chip forms when metal glides over tool freely.



BUILD-UP: High friction causes metal fragment to weld to tool tip.

easier but have a "draggy" effect and make finishing more difficult. With large-grained brittle materials, it works the other way around. An intermediate grain size strikes a balance.

The hardness value of a metal tells fairly well what you can expect in the way of machinability. True, cutting of metals is by shearing action rather than by tearing in tension. But because hardness and ductility are related, the hardness value can serve as an indicator to tell whether a metal will drag as it's being machined.

In processing, metals undergo all sorts of changes—deliberate or otherwise. Nevertheless, their properties are altered as they pass through hot and cold cycles. Hardness, ductility, grain size and other properties are subject to change when a metal has been cast, forged, heat treated, hot or cold-rolled, stamped, extruded or welded. The important thing to consider is the metal's condition at the time it's to be machined.

What's in a Steel?—The chemical composition of a steel influences its machining characteristics to a large extent. Of course, other factors enter into the picture, but some generalizations can be drawn from the elements that make up the alloy.

When carbon is on the low side, a steel's hardness will be low and ductility high. The best range for good machinability is 0.30 to 0.60 pct C. Higher carbon content makes the steel hard and brittle. Lower carbon content makes the steel too ductile and "draggy" for smooth finishing.

Manganese affects machinability in about the same way as carbon. The most suitable ranges are 0.75 to 1.00 pct for Bessemer Steel and 1.00 to 1.30 pct for openhearth. Silicon content works adversely—the higher it is, the worse will be the machinability.

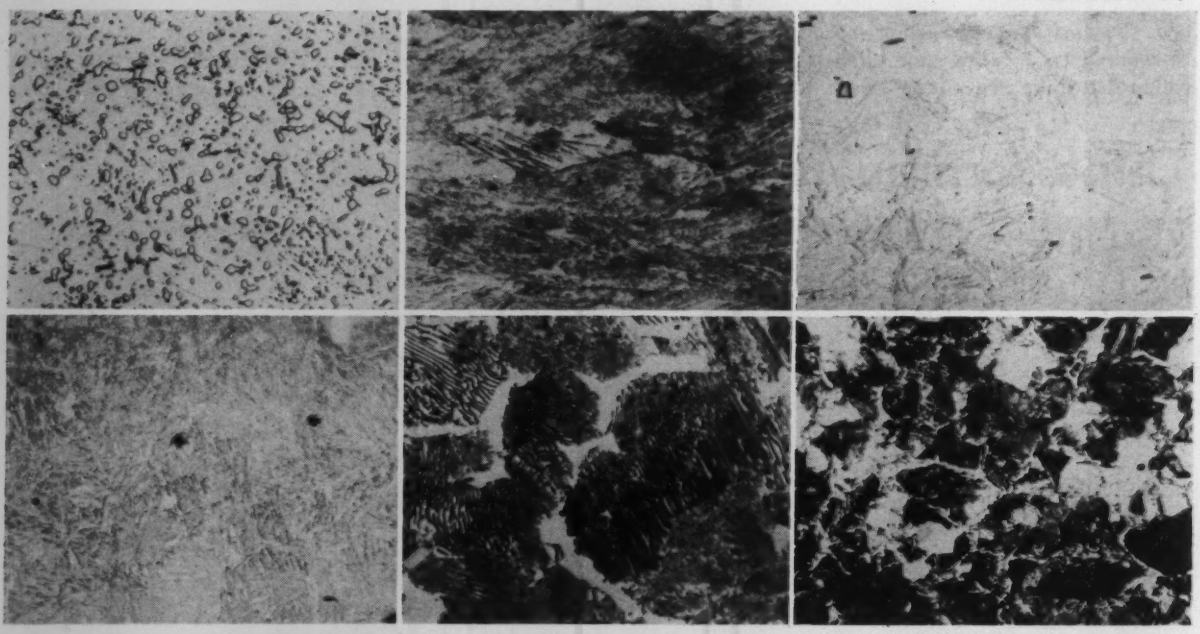
Add Sulphur — Sulphur, like lead, is deliberately added to steel to improve its machinability. For effective control, its content ranges from 0.05 to 0.03 pct. The effect of phosphorus is the same as that of sulphur but not as strong. Its best range is 0.06 to 0.10 pct. Lead, when added to improve machining, should range from 0.15 to 0.35 pct. At times, selenium and tellurium are added to stainless steel for the same purpose.

Chromium, molybdenum, nickel, vanadium and boron additions harden and toughen steels. As such, they simply make machining more difficult. However, annealing of these alloy steels helps machinability.

Tough to Cut—The superalloys—work-hardening, heat-treatable and cast types—offer a real machining challenge because of their high shear strength and work-hardening characteristics. Also, when hardened, they contain carbides; and when annealed, they're gummy. Finish machining is best on hardened material. Cutting speeds are low. Careful selection of the right cutting fluid is a must.

Stainless steels are not as easy to machine as carbon steels. The addition of sulphur, phosphorus or selenium to the straight chromium grades helps to get cleaner cuts and higher speeds. The higher-chro-

Rockwell-Standard Corp.



MICROSTRUCTURES VARY: Dissimilar metal structures affect machinability and shorten tool life. Similar structures prolong tool life considerably. These six typical structures vary considerably in make-up. Starting at top left, they are: (1) spheroidized annealed, (2) strain bands in cold-worked material, (3) as-quenched martensite, (4) tempered martensite, (5) lamellar pearlite and (6) emulsified pearlite.

mium high-nickel types are tough to machine because they work harden.

Cast Irons Cover Range — Machining of cast irons ranges from "easy" to "very difficult." The gray cast irons offer no trouble. White cast irons are hard, strong and have practically no ductility. Consequently, they're extremely tough to machine. Malleable iron machines quite easily even though it is somewhat draggy.

Nodular iron combines good ductility with high strength and machines almost as easily as gray cast iron. However, being harder, it will take higher cutting pressure.

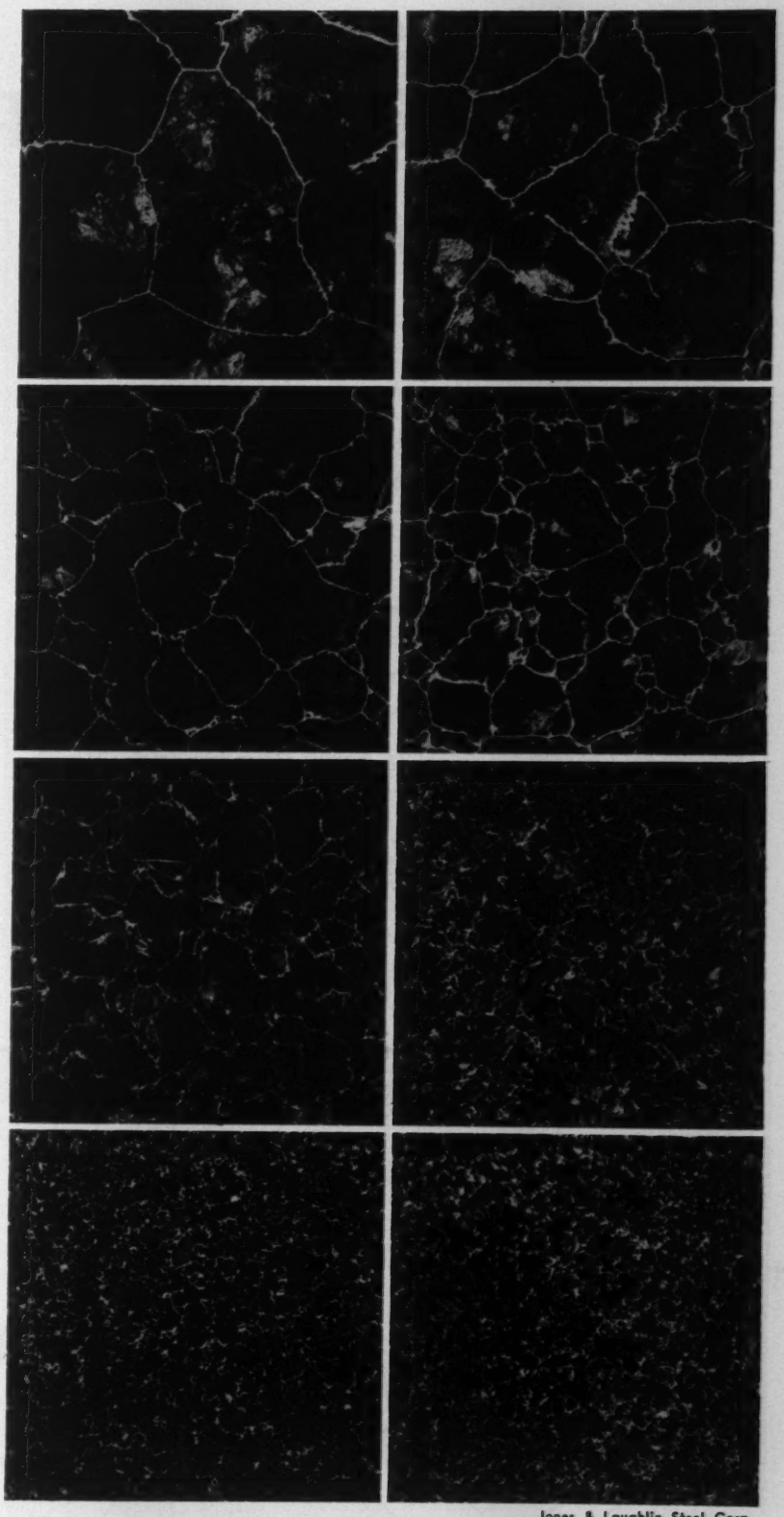
Aluminum Rates Well—The aluminum alloys generally machine quite easily. They require low cutting pressures, but have a high metal removal rate. Their machining characteristics are quite different from other metals.

Just about all magnesium alloys have excellent machinability. You can machine them at top speeds, taking heavy cuts and using high feeds. Cutting pressures are low. Yet, the finishes are smooth and there's no difficulty in maintaining dimensional accuracy. Being a chemically active metal, cutting fluids should contain less than 0.2 pct free acid by weight, and no water.

Copper alloys vary widely in machinability. Electrolytic and deoxidized copper, along with copper-nickel, phosphor bronze, commercial bronze, beryllium-copper and other alloys, all have poor machinability because of their softness. The chips are long, springy and draggy.

Those alloys with fair machinability include leaded bronzes, Muntz metal, Naval brass, tin bronzes and aluminum bronzes. The chips from these alloys are fairly brittle coils that break easily.

The free-machining copper alloys consist of those in the first two groups, but contain additions of lead, sulphur, selenium, tellurium and/or bismuth to promote machinability.



Jones & Laughlin Steel Corp.

CLUE TO CUTTING EASE: Grain size gives some idea of ease or difficulty of machining. Large grains make metal brittle; small grains make it ductile. Starting at top, they're graded from 1 to 8.

Tooling: Speeds and Pressures Exert Heavy Burdens

Modern metals and machines offer a real challenge to cutting tools.

Here's how they're coping with it—aided by more effective cutting fluids.

■ There's one basic reason for using a cutting fluid—that of getting the best machining job at the very lowest cost. And, it's the cutting tool that holds the key to cost control. How well it performs depends on the cutting fluid's ability to protect it.

Cutting tools face all sorts of metals and conditions. They must be able to withstand these conditions under extremes of pressure, heat and shock. To do this, their hardness and strength must be much greater than that of the material that's to be cut—not only at normal room temperature, but within the complete temperature range of the machining operation. They can't be too brittle, nor too weak.

Six Types—No single tool material serves all machining jobs best. But the type to be used will be dictated by the nature of the operation, production volume, material in the product, tool design, type of machine and other factors.

Tool materials fall into six major groups: (1) carbon steel, (2) medium alloy steel, (3) high-speed steel, (4) cast alloys, (5) cemented carbides and (6) cemented oxides or ceramics.

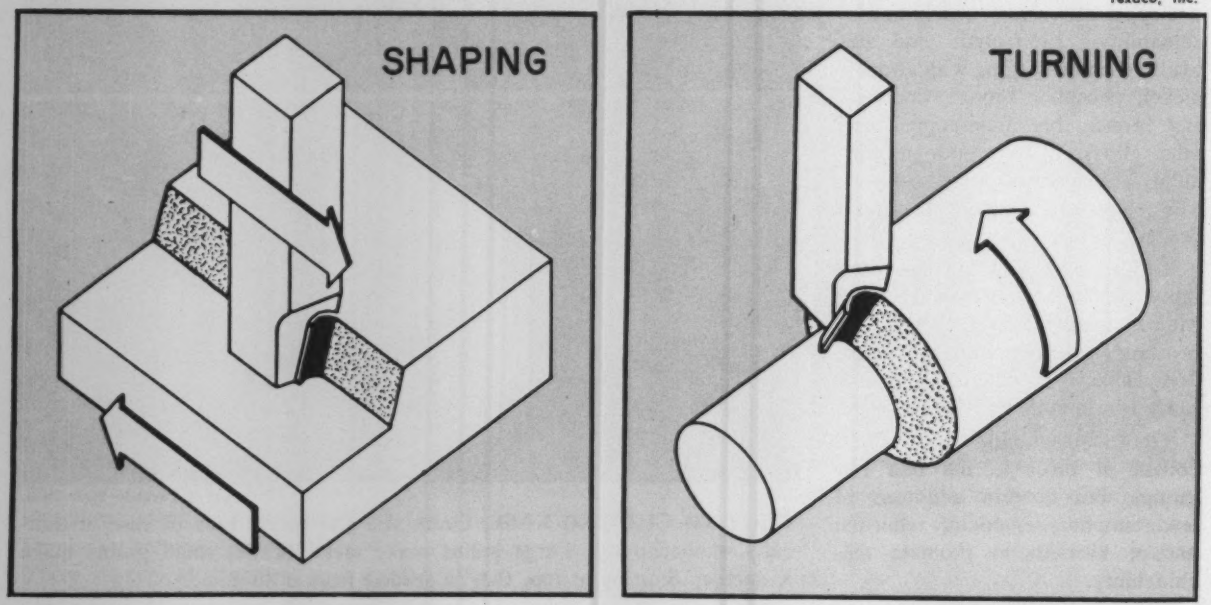
Carbon steel cutting tools give limited service. Made of forged steel containing 0.8 to 1.3 pct C, they have low hot hardness and poor hardenability. Therefore, they're used mainly for light-duty work where speeds and temperatures (up to 400°F) are low.

The medium alloy steels have better hardenability and wear resistance than the carbon-steel tools by virtue of small additions of chromium, molybdenum, vanadium and/or tungsten. As such, they're used to withstand severe wear, but fall short where heat builds up.

Broaden Range — Compared to the carbon steel and medium-alloy steel tools, the high-speed steel tools take a big step forward. Their better resistance to both heat and wear enables them to be used in

Shaping and Turning: Both Take Same Bite

Texaco, Inc.



many operations where the carbon and medium-alloy steels would be unsuitable.

With these improved properties, the high-speed steels can take heavier cuts and be used at higher speeds for longer periods of time.

Among the more common varieties are those having 17 to 19 pct tungsten, 3 to 4.5 pct chromium and 0.75 to 1.50 pct vanadium. In another popular alloy, molybdenum replaces some of the tungsten.

Add Cobalt—The addition of up to 10 pct cobalt to the composition of high-speed steels improves their hot hardness. This, in turn, permits them to be used at much higher speeds. For this reason, they're often called super high-speed steels.

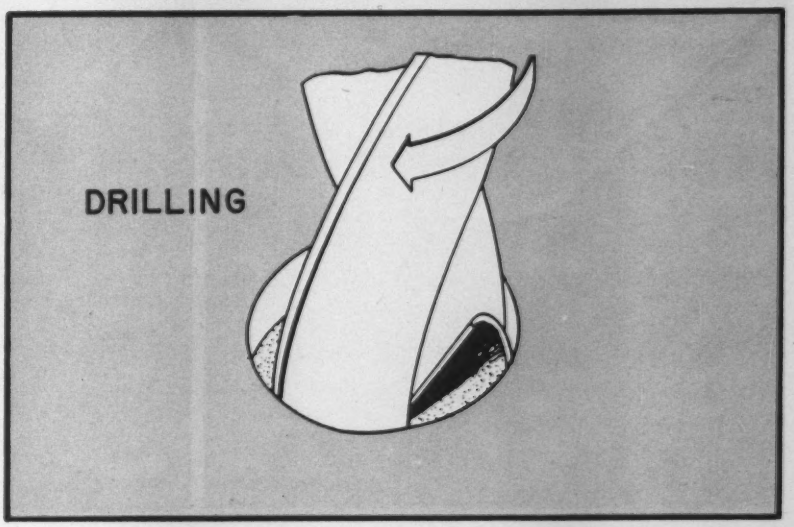
The cast cobalt-base alloys (not cobalt steels) have excellent heat resistance and retain their hardness and effectiveness up to 1500°F. These alloys contain 40 to 50 pct cobalt, 27 to 32 pct chromium, 14 to 19 pct tungsten and 2 to 4 pct carbon. Being cast, they're subject to failure under shock. For heavy cutting operations, the tips should be well supported.

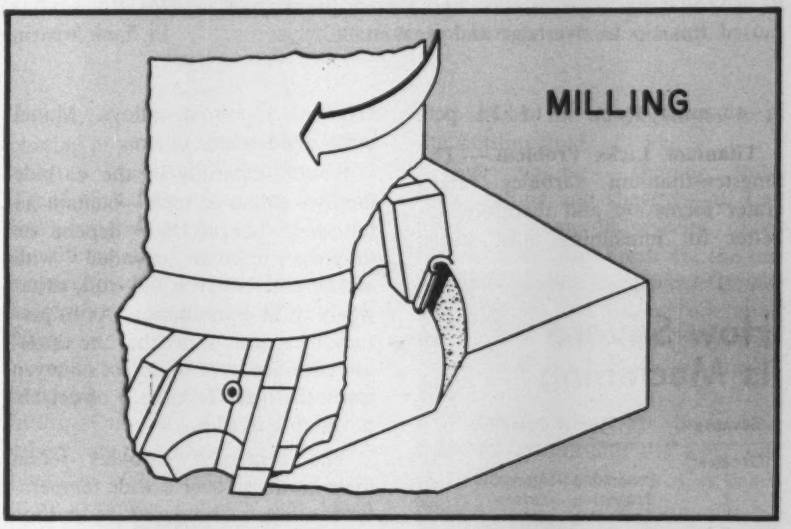
Carbides Combat Wear — The unique properties of the cemented carbides opened many new areas to machining. When they're designed and used in the right way, they do a fast cutting job and have a long life. There's hardly a machining operation beyond their ability. Moreover, you can use them on either ferrous or nonferrous materials.

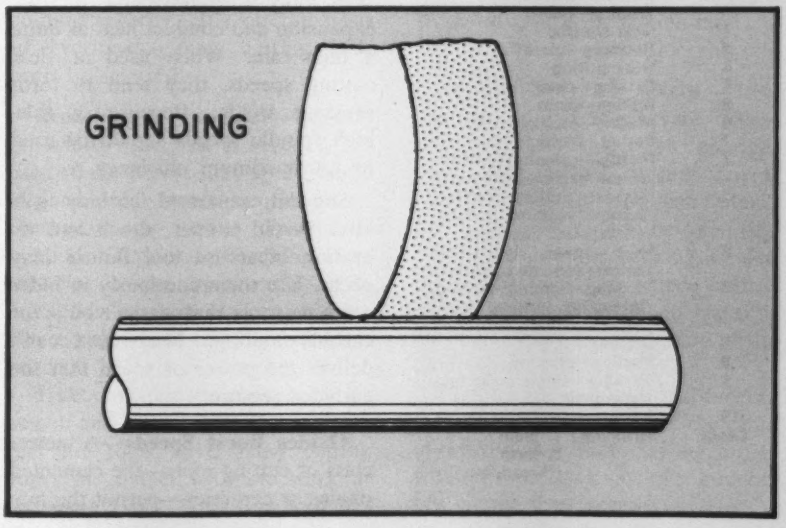
The cemented carbides are made as solid tools, tips for brazing to steel shanks, and as inserts for special tool holders. As tool tips, they come in square and triangular shapes with multiple pre-ground cutting edges.

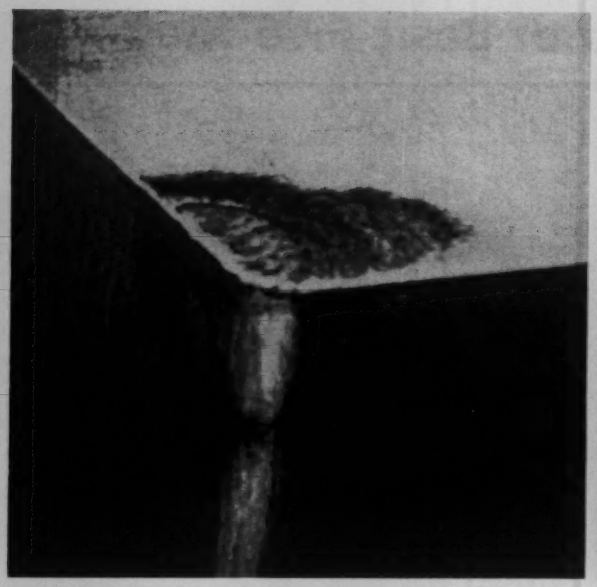
Tungsten carbide finds wide use for machining cast iron and certain nonferrous materials such as the free-cutting copper alloys. When used on steel, wear craters form rapidly on the tool face thereby shortening the tool's life. Cobalt, which serves as a binder, is present

Three of Basic Five Methods

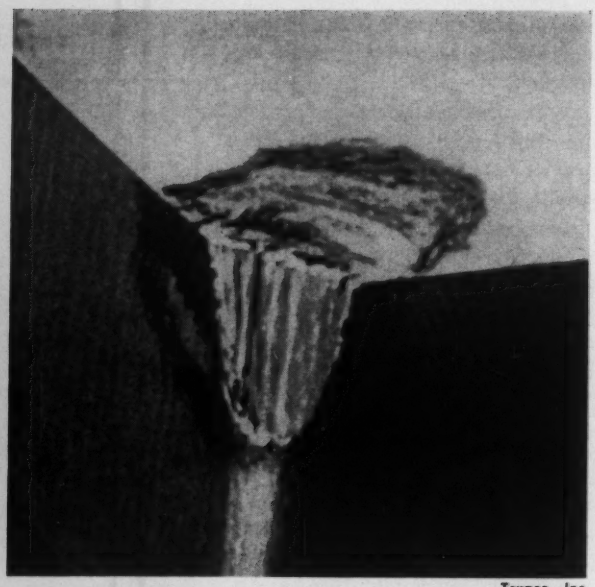








BURNING: Excessive friction and heat of plastic flow caused this tip to overheat and weaken.



Texaco, Inc.

WORN LAND: Poor lubrication and cooling resulted in flank wearing along clearance face from edge.

in amounts from 3 to 16 pct.

Titanium Licks Problem — The tungsten-titanium carbides retard crater formation and therefore are better for machining most steels, bronzes, aluminum alloys, Monel metal, and many others.

Newer materials in the carbide family—called cermets—contain no tungsten. Instead, they depend on titanium carbide bonded with nickel, molybdenum and iron, either singly or in combination. As to performance, tests show that the titanium carbides have up to six or seven times the wear resistance of certain tungsten carbides.

The cemented carbides retain their hardness over a wide temperature range. Compared to carbon steel tools, they have low thermal expansion and conduct heat at quite a high rate. When used at slow cutting speeds, they tend to form pressure welds. Because of this, high spindle speeds should be used to get maximum efficiency.

Support cemented carbide solidly. Avoid chatter, shock and vibration otherwise tool failure may occur. Use them cautiously in older machine tools that weren't built for carbide tooling. Many just can't deliver the power or speed that the carbides require.

Oxides Boost Speeds—A newer class of cutting tools—the cemented oxides or ceramics—permit the machining of steels at 1800 sfpm and higher. Consisting of a refractory oxide bonded with a strong polymerizing cement, they offer several benefits.

First, they're low in thermal conductivity and therefore pick up less heat than other type tools. Also, these materials have less friction at the chip-tool interface than do other types. Chip cratering, too, tends to be less.

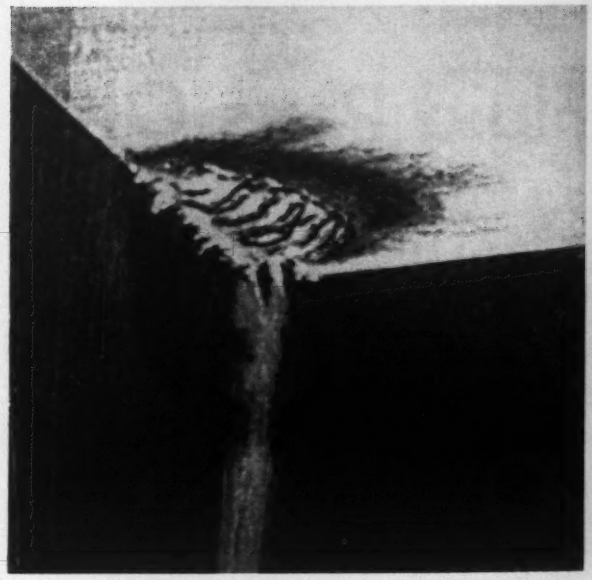
However, they are brittle and chip easily unless they're handled with care. Holders must support the ceramic rigidly since it won't stand too much shock and vibration. As such, avoid using it for interrupted cutting operations.

What Causes Failure?—Heat is the major enemy of cutting tools. It affects tool hardness and strength inversely. When heat builds up to the critical point at the tool tip, it softens the cutting edge. Thereafter, failure sets in rapidly.

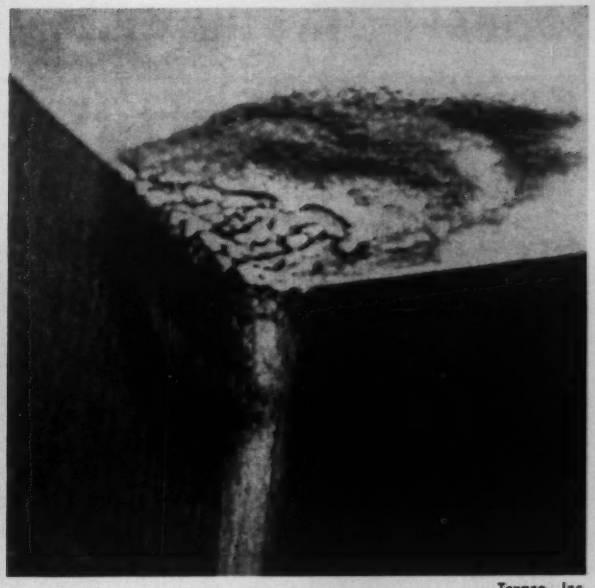
Fracture is another type of failure and is often associated with the harder and more brittle cemented carbides and oxides. Interrupted cutting as in milling, and vibration resulting from poor tool support, cause many such failures.

How Severe Is Machining?

Severity	Type of Operation
(Greatest)	
1	Broaching—internal
2	Broaching—surface
2	Threading—pipe
3	Tapping—plain
3	Tapping—plain
4	Gear shaving
4	Reaming—plain
4	Gear cutting
5	Drilling—deep
6	Milling—plain
6	Milling—multiple cutter
7	Boring—multiple head
7	Multiple-spindle automatic screw machines and turret lathes: drilling, forming, turning, reaming, cutting-off, tapping, threading.
8	High - speed, light - feed automatic screw machines: drilling, forming, tapping, threading, turning, reaming, box milling, cutting off
9	Drilling
9	Planing—shaping
9	Turning—single point tool, form tools
10	Sawing—circular, hack
(Least)	Grinding—1. plain 2. form (thread, etc.)



CRATERING: Wear starts on tool face away from edge. When it reaches tool edge, failure follows.



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BUILT-UP EDGE: Combination of heat and pressure welds metal to tip. Rough surfaces result.

Tool wear can be noted in two areas—on the clearance face and on the tool face above the cutting edge. The first is called wear land. It starts at the cutting edge and extends along the clearance face.

The second type, called cratering, occurs away from the tool edge on the face. As it gets larger, it works its way to the edge, after which the edge weakens and fails suddenly. The proper cutting fluid can correct this type of failure.

Edge Builds Up — Heat from friction and plastic deformation of the metal concentrates at the tool tip. Combined with extreme pressure at this point, tiny particles of metal weld themselves to the tool tip, leaving what is known as a built-up edge.

As parts of this built-up edge break away from the tool tip, they leave rough spots in the surface finish. This condition can be corrected by reducing friction to a low value—a role in which a proper cutting fluid plays an important part.

Operation Changes Picture— Just as changes in the structures of materials often call for a completely different set of machining conditions, a change from one machining process to another will often alter a material's machinability. True, that the operation is only one of many variables affecting the conditions under which a part is to be machined, but it may be the one to require a change in the cutting fluid.

Individually, there are literally hundreds of machining operations in use. Only five of these are basic; others are modifications or combinations of these shown here. The more common methods are listed in the table by their degree of machining severity. It's on the basis of severity that many cutting fluids must be selected.

Broaching is Toughest—Internal broaching rates first in severity. It's used to cut holes, slots and grooves in parts which would be difficult or impossible by other machining methods. External broaching rates the No. 2 spot in severity. This method is used in place of milling where speed and smooth finish are needed.

Threading and tapping, both internal and external, are severe in that the tools have many cutting edges in contact with the work at the same time. Also, the tool design shields the cutting edges from the cutting fluid.

Gear making — shaping, hobbing, milling and shaving—all rate about the same in severity. Tool life, accuracy and finish are the important elements to consider. Reaming, also, is a finishing operation and surface quality should be used as a guide in selecting the cutting fluid.

Milling, one of the basic five, feeds its cutters into the work one at a time. Cutting speed depends on the material and how quickly heat can be dissipated. Flooding the work with the right cutting fluid can step up the speed considerably.

Drilling Not Too Severe—Drilling, one of the less severe operations, either makes or enlarges holes. But unlike turning operations, the cutting fluid can't reach the point of contact between the drill and the work very easily. So, one alternative is to reduce cutting speed. You can tell when speed is too high by the wearing away of the outer corners of the drill.

Planing and shaping, and turning with single point tools rate the same in severity as drilling. Sawing, either with a power hack saw or a circular saw, is the least severe.

Care of Cutting Fluid Pays Off

Proper handling, storage, control over cleanliness and application of cutting fluids should be part of a regular program. Here are some of the ways to put it to work.

■ Cutting fluids cannot be effective if improperly used. To receive their full benefit, it's a must that the fluid get to the working zone and stay there until the job is complete.

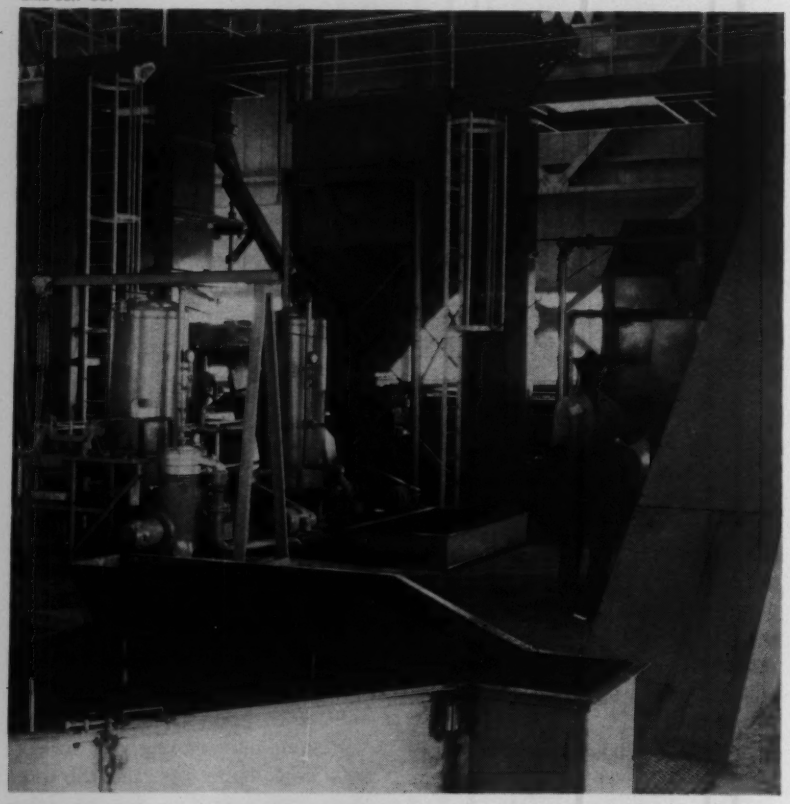
Experience tells us that best results are obtained with large fluid volume under low pressure. A heavy flow also insures against the occasional dry—and dangerous—cutting periods.

The Right Way—The drawings point up the proper method for feeding cutting fluids. The top view shows the correct way. Note that both the tool and the work receive the benefits of the fluid.

In the middle drawing, the fluid does not perform most effectively because it splashes away from the work area. When fluid is applied as in the bottom view, it neither cools nor lubricates the tool or work to any satisfactory degree.

Exceptions to the use of low pressure may occur during drilling, reaming, and tapping. In these instances, fluid can be supplied under pressure through the tool shank without splashing or deflecting.

Link-Belt Co.



RECOVERY VITAL: After machined chips are crushed to uniform size, they're spun in extractor setup for removal and recovery of cutting oil.

When drilling deep holes, there should be enough fluid to flush the chips completely out of the hole. If chips gather at the edge of a drill, abrasion starts. Soon the cutting edges break down and give inaccuracies and poor surface finish. In reaming, unflushed chips will produce oversize holes and scoring.

Washes Out Dirt—In grinding jobs, the fluid must carry the grinding dirt to the settling tanks. If it does not function properly, the dirt which settles on the centers, guides, and chucks will affect the accuracy of the work.

Proper design of a cutting fluid system will give rewards. Adequate size piping, and making sure that there are no restrictions to maximum nozzle flow are important factors. Here's a simple rule-of-thumb that gives good results. The gallons of cutting fluid per minute should equal the maximum horsepower needed for the cut.

What about temperature? For best tool life, the cutting fluid should be kept at a fairly low temperature, say about 90°F. Care should also be taken to see that the temperature doesn't increase too much during the day's operation.

Watch the Mix — Proper handling and good control in the shop are musts for gaining all the benefits of cutting fluids. Take the case of rust inhibitors. If machine sumps are refilled with water only, too lean a mix results. This leads to inadequate rust control. Results: poor tool life and finish. On the other hand, too rich a mix is costly.

One of the best ways to control cutting fluids is by premixing. This is easy to do. In the case of the small shop, the mixing tank can be a 55-gal drum with the top removed. As the volume of make-up

material increases, larger tanks can be used.

A central circulating system affords a means of proper control on a larger scale. By premixing, you'll not only get better control of the cutting fluid but you also get greater economy of operation.

Indoor Storage—Cutting fluids should not be exposed to deteriorating conditions. Drums should be stored indoors at room temperatures when possible. If outdoor storage is necessary—and there is danger of product breakdown—roll the drums before the fluid is used. Drawing a sample for testing before use is good practice. One spoiled drum can cause a lot of trouble.

Very often, tank cars deliver cutting fluids in bulk. During cold months, the product may become viscous, making it very hard to pump the fluids from the tank to the plant. In these cases, steam is sometimes used for warming to aid transfer of the fluid. Take care that no localized over heating occurs; some of the water and solvent in the product may be driven off. This minor upset among the ingredients may make the product unusuable.

Longer Service Life—How long should a cutting fluid perform before it must be discarded? There's no stock answer. The length of time varies from plant to plant. But, getting the largest possible service life from a fluid includes these two steps: (1) get rid of the sources of contamination and (2) remove chips and dirt as soon as possible.

Leakage of machine lubricating oil is one of the most common and unwanted sources of contamination. It appears with old equipment and is one of the hardest sources to control. It causes dirty machines and loaded wheels. If allowed to persist, it may mean removal of the cutting fluid.

The parts being machined are also sources of contamination. They may contain materials such as rust-proofing compounds, or

Feed Fluid Where It's Needed

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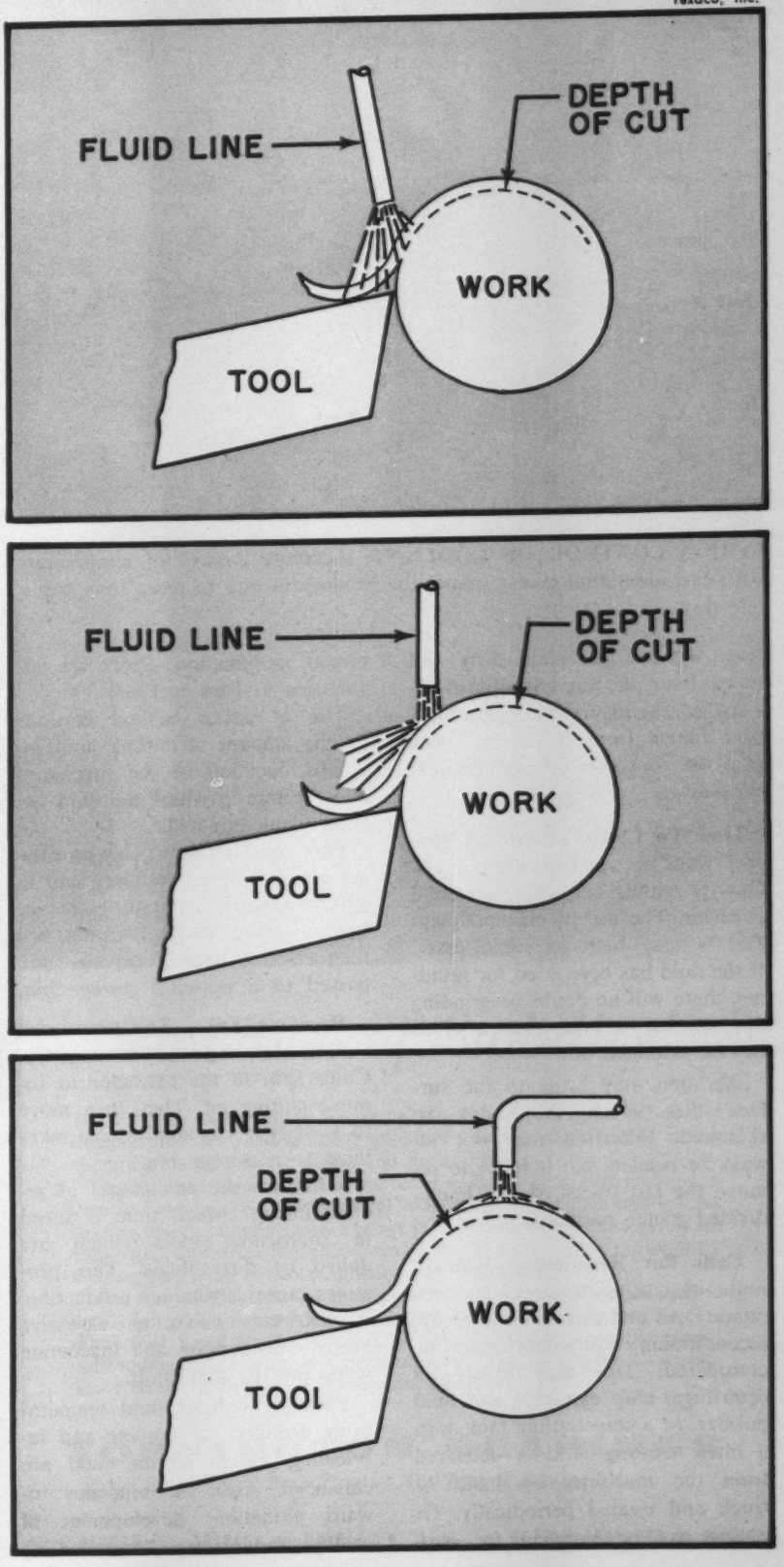

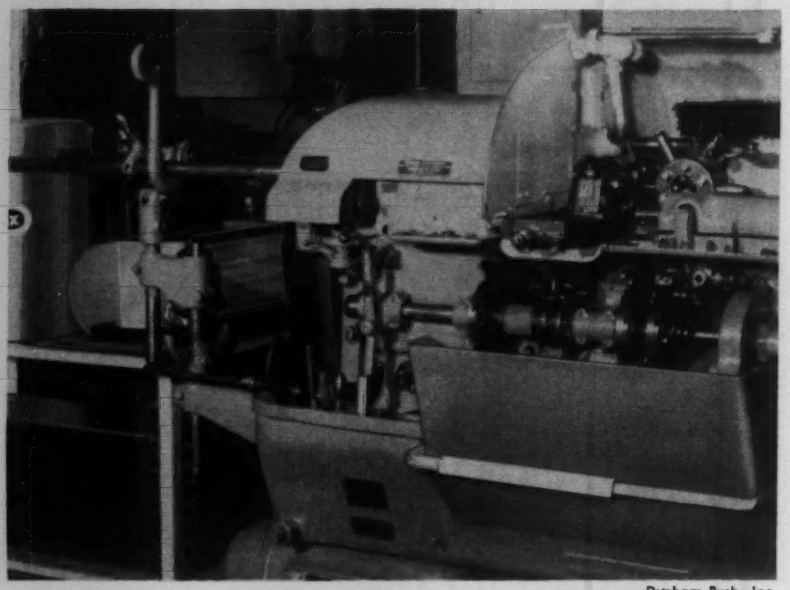

Dunham-Bush, Inc.

STRESS CONTROL OF COOLANT: Accurate control of temperature with cast aluminum cooler boosts the production rate to more than triple.

they may be just plain dirty and rusty. Even the air contributes toward contamination. For example, acid fumes from a plating room give rise to corrosion and product breakdown.

How To Clean—There are several ways to clean cutting fluids. Gravity settling helps separate solid particles. The use of magnetic separators may help in some cases. If the fluid has been used for grinding, there will no doubt be grinding dirt floating on the surface. This can be skimmed off.

Aeration may bring to the surface dirt which may also be skimmed. Filtration may not always be needed, but it helps to remove the last traces of any finely-divided metal particles.

Calls For Reclaiming—Because reuse of cutting fluids is an economic need and can be done easily, reconditioning equipment should be considered. This may involve a centrifugal chip extractor and fluid purifier, or a chip settling tank with a filter. Cutting fluid is delivered from the machines by hand or truck and treated periodically. Or piping can be installed for continuous purification. There are advantages to both methods.

Use of either method depends on the amount of cutting fluid involved, location of the machines, and the rate at which the fluid becomes contaminated.

Photo (p. 100) shows chip processing and cutting oil recovery unit in which a work separator removes large pieces of metal. Turnings are then crushed to uniform size and passed to a wet-chip storage bin.

Removes Oil — The next step calls for loading into an extractor. Chips spin in the extractor to remove cutting oil. They then move to a bucket elevator which takes them to a storage bin.

What are the advantages of reconditioning? Much time is saved in sharpening tools which are dulled by dirty fluids. This promotes more continuous production. It also cuts down on excessive power consumption and inaccurate work due to dull tools.

Cleaning reduces fluid temperatures. Results: the cooling and lubricating values of the fluid are enhanced. Also, the tendency toward oxidation, development of acidity, and chances for gumming are reduced. All these benefits compensate for perhaps a slight increase in first cost.

Bacteria raise havoc with some cutting fluids. They feed on certain ingredients, break them down, and destroy the fluid's effectiveness. Ways by which bacteria contaminate cutting fluids are many and devious. The water used, metal parts, workers' hands, and even the air are sources. Products of bacterial action are corrosive and very often have foul odors—the well-known Monday morning odor—to which many machine operators object.

When this happens—and aeration doesn't help—drain or pump out all the used fluid from the system. Then disassemble as much of the system as possible for cleaning.

Disinfect the System—After cleaning and reassembly, a proper detergent should be circulated throughout the system. After draining, circulate a disinfecting solution through it. Then, after a water flush, refill with fresh cutting fluid.

Despite the long useful lives of cutting fluids, the time comes when they have to be discarded. In many locales, law forbids the disposal of used fluids as such; they must be treated. This presents no great problem. Adding chemicals removes unwanted constituents. The clear water phase is then run to waste.

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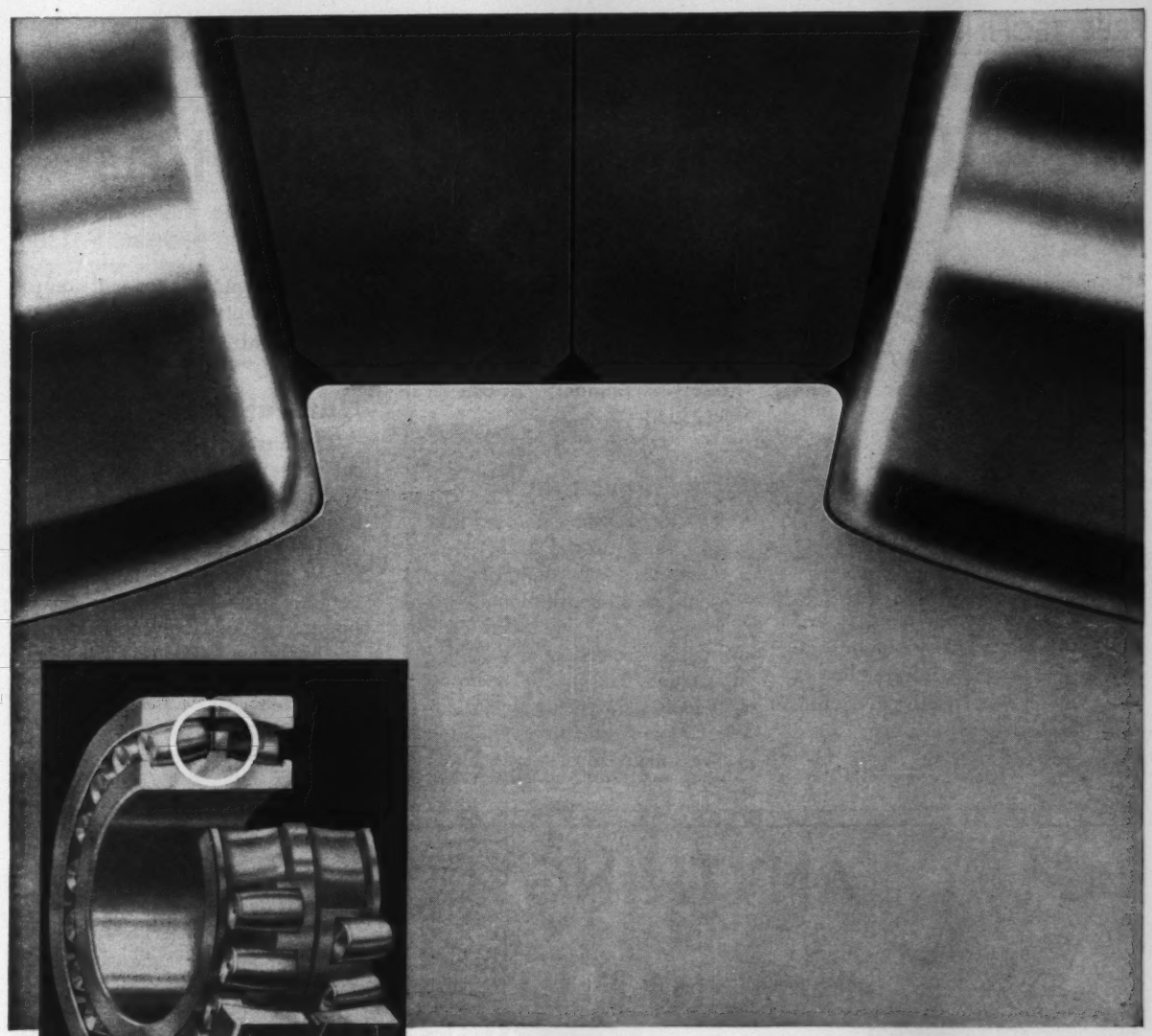

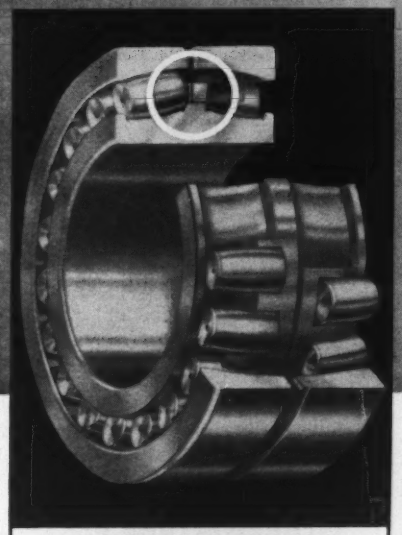

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The integral center guide flange of the *Torrington* Spherical Roller Bearing provides *positive* roller guidance—the one best way to insure operating stability under radial and thrust loads.

Center guide flange surfaces and roller ends are ground to a common spherical radius. The asymmetrical roller seeks this flange under load, bearing lightly but constantly against it. Roller wobble and skewing are eliminated, and stress concentrations leading to early failure are avoided. Bearing operation is cooler, quieter and smoother.

The integral guide flange is adapted from the same principle used in the design of Torrington Tapered Roller Bearings. It is an engineering refinement, based on experience in all types of applications, that insures outstanding performance in your equipment. **The Torrington Company, South Bend 21, Ind.—and Torrington, Conn.**

TORRINGTON BEARINGS

Every Basic Type of Anti-friction Bearing

SPHERICAL ROLLER • TAPERED ROLLER • CYLINDRICAL ROLLER • NEEDLE • BALL • NEEDLE ROLLERS • THRUST

New Catalogues and Bulletins

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, p. 107.

Aluminum Mill Products

Detailed in a 24-page manual is a wide range of aluminum mill products. The manual explores characteristics of aluminum and types of alloys. Photographs and tables give complete information on wrought alloys, sheet, plate, foil, rod, bar and wire, and extrusions. Properties of casting alloys, and pictures and descriptions of all types of forgings are included. Domes, building wire, and power cables are some of the other subjects covered. (Kaiser Aluminum & Chemical Sales, Inc.)

For free copy circle No. 1 on postcard, p. 107

Pipe Fluoroscopy

Illustrated with photos, radiographs, and drawings, a 12-page booklet discusses limitations and advantages of conventional fluoroscopy. The booklet reports on fluoroscopic inspection of submerged arc-welded line pipe. The booklet also includes basic principles, preliminary investigations, pilot installation, production unit, and fluoroscopic standards for mill control of weld quality. (Philips Electronic Instruments)

For free copy circle No. 2 on postcard, p. 107

Natural Cryolite

The history, physical and chemical properties, and uses of natural cryolite is illustrated in a 24-page booklet. It is an ideal reference piece. Cryolite is a desirable product in any process where high temperature stability, superior fluxing power, or good solvent properties are important. (Pennsalt Chemicals Corp.)

For free copy circle No. 3 on postcard, p. 107

Limit Switch

Full details on a center, neutral, plug-in limit switch are given on a two-page data sheet. In many situations, the switch is capable of doing the work of two separate limit switches, resulting in the saving of time, space, and wiring. A complete assembly consists of switch and mounting block. Photos, dimension drawings, operating details, prices and discounts are included on the sheet. (Micro Switch)

For free copy circle No. 4 on postcard, p. 107

Graphite-Tube Furnace

An expanded line of modernized graphite tube furnaces meet use at temperatures up to 5000°F. A bulletin shows several models recently built for a variety of high temperature research and production assignments. Specifications are included. (Harper Electric Furnaces Corp.)

For free copy circle No. 5 on postcard, p. 107

Shot and Grit

Facts concerning the use of shot- and grit-abrasives in blast cleaning are detailed in a fully-illustrated 30-page booklet. The booklet is di-

DIAMOND
ANYTHING
IN
Perforated Metal
We're not magicians but, in nearly half a century of successful experience, have acquired such a wide range of dies, tools and other plant facilities that almost anything in the way of perforated metal sheets, plates, or parts can be produced efficiently and economically.
Our new 32-page "Catalog 59" illustrates a great variety of perforated metal patterns and gives complete working data. Also shows many modern industrial applications. Write for a free copy and let us quote on your requirements. When given sufficient information, our experienced engineers are often able to make money-saving suggestions—without charge or obligation.
Control Panel for Electric Range. We fabricate special panels or parts to any desired extent.
DIAMOND
MANUFACTURING
COMPANY
WYOMING, PENNA.
(WILKES-BARRE AREA)
Manufacturers of DIAMOND Perforated Metal Panels for Modern Acoustical Ceilings.

vided into five sections; the first concerns an appraisal of blast-cleaning functions and materials, the second reports on the progress and research achievements in the field of abrasives. The subject of the third section is housekeeping habits. The fourth section includes chart-illustrated methods of computing costs of new abrasive products, and the final section suggests a method of cost-free investigation of blast-cleaning savings. (National Metal Abrasive Co.)

For free copy circle No. 6 on postcard, p. 107

Magnetic Pulleys

Permanent magnetic pulleys, designed for automatic separating performance, are featured in an illustrated brochure. Dimensions and general data appear in table forms. (Eriez Mfg. Co.)

For free copy circle No. 7 on postcard, p. 107

Multi-Arc Welding

Highlighted in an illustrated bulletin is the technical and economical importance of recent developments in multi-arc welding. The four-page brochure reviews the experience of users in shipbuilding, heavy construction and fabrication. Also explaining how the multi-arc principle reduces equipment requirements, it includes a table summarizing comparative costs. (J. B. Nottingham & Co., Inc.)

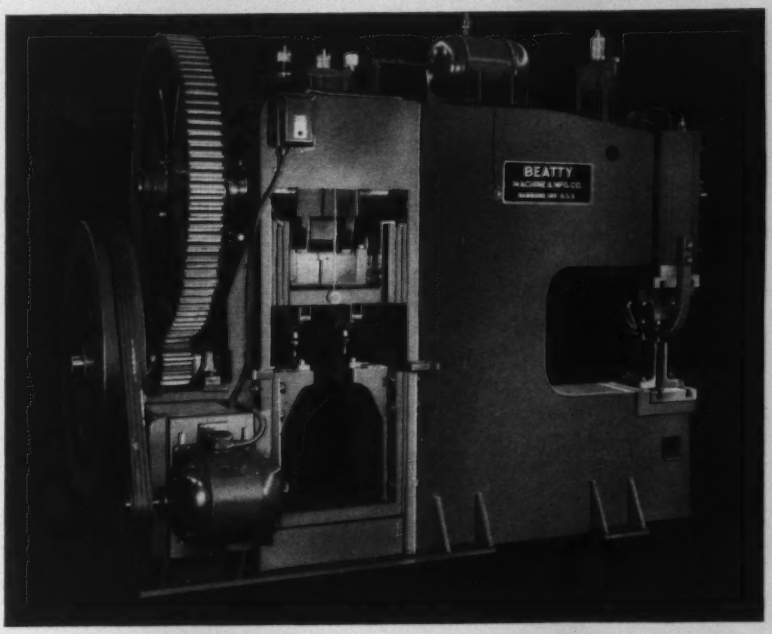
For free copy circle No. 8 on postcard, p. 107

Reinforced Plastics

Features claimed in a short bulletin, for a complete line of hot-melt, water-soluble compounds, include: When liquidized the compounds can be cast to final shape without use of parting agents; when solidified they have a compressive strength up to 19,000 psi at temperatures up to 475°F. Cast shapes retain dimensional accuracy from room temperature to 475°F. Molds or mandrels can be dissolved in water or remelted; thus material can be reused indefinitely. (Rezolin, Inc.)

For free copy circle No. 9 on postcard, p. 107

When Will ONE Machine Do The Work of THREE?



WHEN IT'S A BEATTY DETAIL BEAM PUNCH

Here's a real cost-saver that punches I-beams in just three passes instead of the usual five, and further speeds production by eliminating the end-for-end turning of beams. Many shops require three ordinary machines to do the work which can be handled by one Beatty Detail Beam Punch. This punch not only saves floor space, but also reduces your equipment investment. High dies in the open throat portion punch webs of beams, angles, channels and plates. Punch tools in overhanging bolsters in the guillotine portion punch holes in flanges on either side of the webs of beams. Write for complete details.

SPECIFICATIONS — No. 7 Detail Beam Punch. Capacity: 100-tons or punching 1¼" hole through 1" mild steel.
WEB PUNCH END: Face of Ram, 6" x 18" — Face of Table, 6" x 18" — Distance ram to table, stroke up, 21¾" — Length of Stroke, 1¾" — Depth of Throat, 30". FLANGE PUNCH END: Opening through frame, 26" — Length of stroke, 2" — Distance ram to table, stroke up, 12".

TOOL EQUIPMENT: WEB PUNCH END — One set single gag punch tools for punching plates, angles, webs of beams, channels and shapes. FLANGE PUNCH END — Two sets of single gag punch units suitable for punching flanges of beams and channel sections.

Punch units for both ends are of the drop stem type for locating the punch in proper position.

ONE OF THE BEATTY FAMILY OF METAL WORKING EQUIPMENT: Shears, Punches, Presses, Spacing Tables, Bulldozers, Stamping Trimmers

BEATTY MACHINE & MFG. CO.
936 150th St., Hammond, Indiana

Extruded section reduces material required 65% on this flash butt-welded missile part

By leaving 2/3 of the titanium required at the mill, dramatic savings were effected on this ram jet engine part used in the Bomarc.

Amweld quoted the job, suggesting a special extruded section shown here, and saved 19.8 lbs. of expensive titanium per ring. The flash butt-welded rings from extruded sections offered additional savings in machining time, since only a small amount of metal had to be removed.

Amweld is equipped to supply flash butt-welded rings and circular products in stainless, titanium, aluminum, as well as a wide variety of corrosion-resistant alloys. If you would like to know more about Amweld's welding, fabricating and machining facilities, phone or write.

GET THE FACTS ABOUT AMWELD

New 20-page catalog describes flash butt-welded rings and circular products manufactured by Amweld. Also booklet entitled, "How Flash Butt-Welded Rings are Made."

AMWELD® INDUSTRIAL PRODUCTS

THE AMERICAN WELDING & MFG. CO. • 120 DIETZ ROAD • WARREN, OHIO

FREE LITERATURE

Continued

These publications describe money-saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

Silicone Products

Listing major product uses and benefits, an eight-page illustrated bulletin presents a complete line of silicone products. The publication features silicones for: antifoam and release agents, lubricants, paper release, paint and paint additives, and electrical insulation. Space is also devoted to silicone rubber, including silicone-rubber compounds. (General Electric Co.)

For free copy circle No. 10 on postcard, p. 107

Freight-Car Handling

Versatility of a freight-car handling unit is explained in a 32-page booklet. The unit runs on rubber tires on the road. It also runs on railroad tracks. After a separate set of wheels drop down on the rails, the unit is ready to take on freight - car handling problems. (Whiting Corp.)

For free copy circle No. 11 on postcard, p. 107

Relief Valve

A short bulletin describes a regulating relief valve. The valve governs the discharge pressure of constant speed pumps in oil or water service. The valve can be used at initial pressures to 500 psi and temperatures to 250°F. Features, operation and installation information, photos, drawings, and charts are included. (Atlas Valve Co.)

For free copy circle No. 12 on postcard, p. 107

Tool Holders

Full-floating tool holders are covered in a four-page booklet. These holders automatically compensate for parallel and angular machine-spindle misalignments. (Burgmaster Corp.)

For free copy circle No. 13 on postcard, p. 107

Electric Tachometers

Described in a catalog are nine tachometer indicators and six electric generators for tachometer service. Also included in the four-page catalog is information covering the use of this type of equipment in connection with variable speed applications, and how these tachometers may be installed at the point of machine operation with speed indicators located at the operator's station. (Madison Electric Products, Inc.)

For free copy circle No. 14 on postcard, p. 107

Vises and Tables

Showing more than 70 items, a pocket-sized catalog includes drill-press vises, angle vises, milling-machine vises, air vises, adjustable angle plates, rotary tables, indexing tables, and others. This 18-page publication fully illustrates and describes the complete line of products. Specifications and prices are also included. (Chicago Tool & Engineering Co.)

For free copy circle No. 15 on postcard, p. 107

Electric Plants

Electric plants, powered by diesel engines, are featured in an eight-page booklet. Engineered for the construction, marine, railroad and industrial markets, the electric plants vary from 2000 to 7500 w. Fuel economy and quick, cold-weather starting are obtained by the diesel engine's direct injection combustion system. (Kohler Co.)

For free copy circle No. 16 on postcard, p. 107

Spectrometer System

Details on a new gamma spectrometer system are contained in a data folder. The system eliminates the "dark current" defect common to conventional systems. The unit offers better resolution over a wider range, and provides greater precision in gamma spectroscopy than possible with any other equipment.

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. **3/3/60**

Circle numbers for Free Technical Literature, Design Digest, or New Equipment:

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41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
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BUSINESS REPLY MAIL

No postage necessary if mailed in the United States

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Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. 3/3/60

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Title .....

Product Manufactured .....

Company .....

Co. Address .....

.....

City ..... Zone .... State .....

FREE LITERATURE

Included in the folder is a price list, and 15 graphs showing spectra for various isotopes. (Nuclear Measurements Corp.)

For free copy circle No. 17 on postcard, p. 107

Chromallizing Designs

Illustrations in a short bulletin explain the do's and don'ts of designing parts for chromallizing. Drawings show proper radii and blending of corners to insure smooth, finished surfaces. Good thread design is also illustrated. (Chromalloy Corp.)

For free copy circle No. 18 on postcard, p. 107

Industrial Plastics

A 16-page booklet outlines the properties, applications, and availabilities of nylon, teflon, base resin, and other new industrial plastics. The booklet also covers nylon tubing and braided hose, and presents data on specialty nylon formulations. Also included is engineering information on a basic fluidized bed coating process. (The Polymer Corp.)

For free copy circle No. 19 on postcard, p. 107

Mechanical Seals

Of particular interest to engineers and designers, a four-page design-data folder concerns itself with mechanical seals. Two nomograms facilitate the determination of frictional heat and power absorption for rotating mechanical seals. Also included are the maximum, permissible shaft speeds for rotating spring-type seals. (Sealol Corp.)

For free copy circle No. 20 on postcard, p. 107

Zirconium

Information concerning zirconium is contained in a fact file. The file supplies technical data, application and available forms of the metal as developed and compiled by manufacturers and fabricators of zirconium. A prominent construction material in atomic reactors, the metal has many applications in other industries. The file includes useful data and sources of supply of zirconium for executives, technical and research personnel engaged in electronics, automotive, chemical processing, aircraft, missiles, and other fields. (For free copy write on company letterhead to The Zirconium Assn., 2130 Keith Bldg., Cleveland 15)

For free copy circle No. 21 on postcard, p. 107

Investment Casting

Information on the latest methods of investment casting is contained in a 20-page brochure. Explaining a new ceramic shell-casting process, the brochure also shows some of the new possibilities now available in investment casting. (Hitchiner Mfg. Co., Inc.)

For free copy circle No. 22 on postcard, p. 107

Chemical Materials

A complete line of polycarbonate resins, phenolic resins, varnishes, molding powders, and fused magnesium oxide is illustrated and described in a 12-page brochure. The booklet covers product features, special properties, and detailed technical data on the aforesaid materials. (General Electric Co.)

For free copy circle No. 23 on postcard, p. 107

Accessory Cabinet

A description of an accessory cabinet is contained in a four-page bulletin. The cabinet accommodates accessories used with all jig grinders and jig borers. Providing custom-tailored drawer space for all items, the cabinet has a large work surface (29½ x 60 in.) of durable laminated plastic. (Vidmar, Inc.)

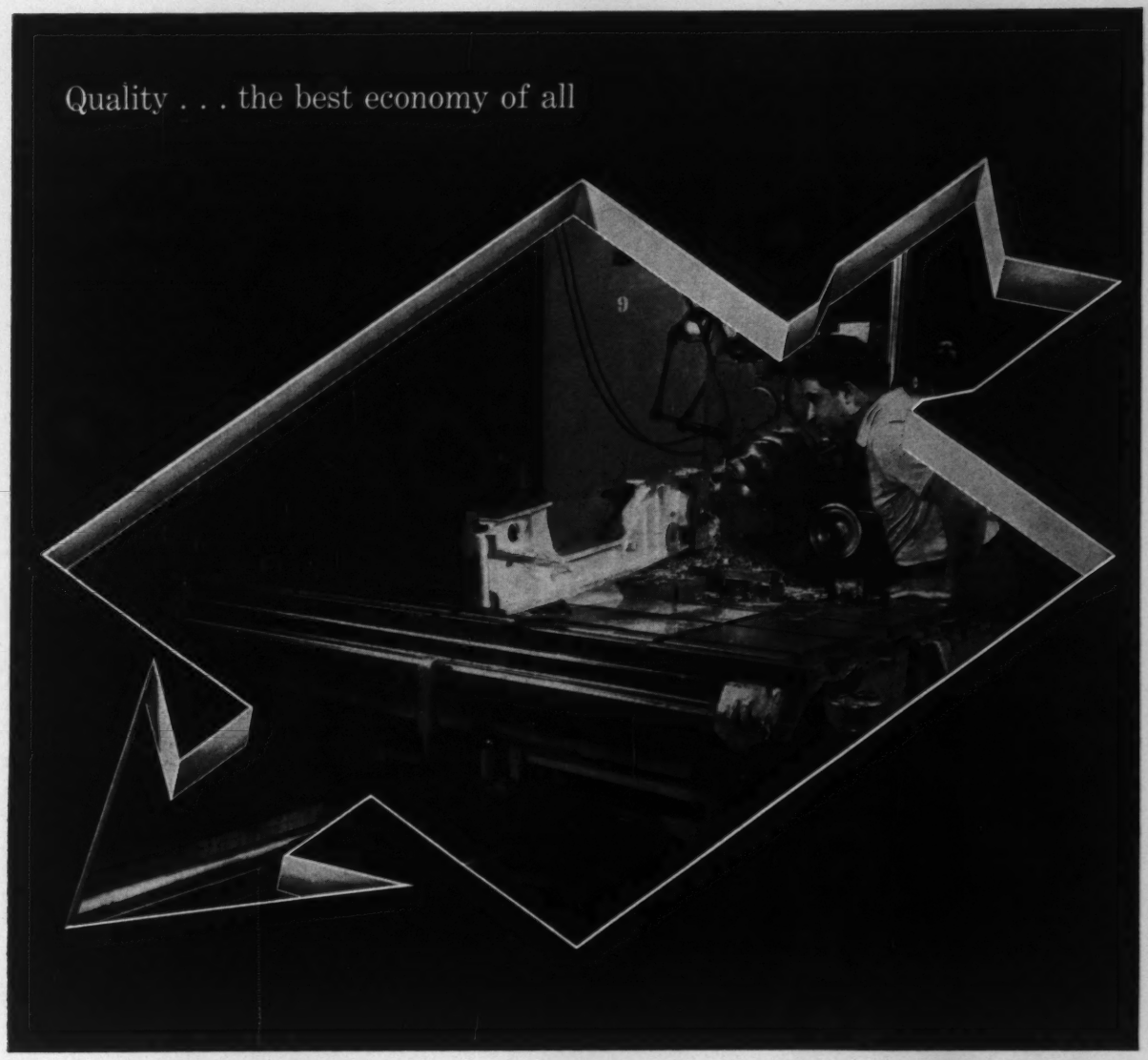
For free copy circle No. 24 on postcard, p. 107

Milling-Machine Parts

Detachable milling-machine arbors and adapters are described in a folder. Hardened and ground arbors are interchangeable with 40 to 50 taper adapters. This permits more continuous use of milling machines with increased production. Price lists are included. (J & S Tool Co., Inc.)

For free copy circle No. 25 on postcard, p. 107

Quality . . . the best economy of all



Fight the cost of "Stick-Slip" with Sunoco Way lubricant

"Stick-slip", the alternate grabbing and releasing of slow-moving carriages, can seriously score machine ways and ruin fine workpiece finishes.

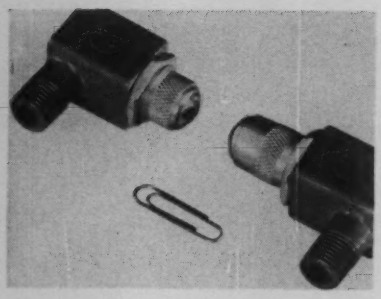
Avoid this trouble and expense with Sunoco Way Lubricant, known throughout the world for its ability to cure "stick-slip". Special ingredients in Sunoco Way Lubricant form a durable, reinforced lubricating film along the mating surfaces. Result: There is no metal-to-metal contact even during week-end shutdowns; machines start easily; carriages move without intermittent grabbing. YOU GET FINER FINISHES, FEWER REJECTS.

Ask your Sun representative to show you how others have benefited by using Sunoco Way Lubricant. Or write to Dept. IA-3 SUN OIL COMPANY, *Philadelphia 3, Pa.* In Canada: Sun Oil Company Limited, Toronto and Montreal.

SUNOCO

MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

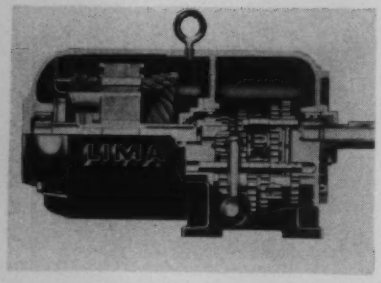
New Materials and Components



Proximity Sensor Operates on Reflected Light

Combining light source and photocell in a single unit—2¼-in. long by 1⅛-in. in diam—a proximity sensor responds to metallic and non-metallic objects. The scanner provides simple and easily installed means for handling a wide variety of counting and control operations. The unit senses objects or control areas at distances up to 2 in. Anodized aluminum housing, has provision for mounting in a single ¾-in. hole. Four-prong base allows connection to the control circuit. (Farmer Electric Products Co., Inc.)

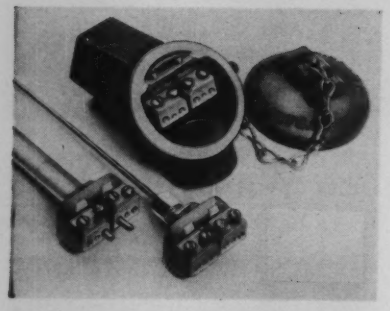
For more data circle No. 26 on postcard, p. 107



Selective-Speed Drive Mounts in Any Position

Mounting in any required position, a gearshift drive features stressproof steel shafting in the motor and in the gear box. Hardened splines on the spline shaft give good service requirements and long life. Redesigned internally, the drive now has lifetime sintered bushings and lubricated-for-life ball bearings. Available with different output speeds, the drive operates on standard 208-, 220/-440-, or 500-v, 3- or 2- phase, 60 cycle current supplies. (The Lima Electric Motor Co., Inc.)

For more data circle No. 27 on postcard, p. 107



Connection Head Features Compact Size

Made of semi-steel, a thermocouple connection head is rugged and weather proof. Its design permits useful application in high ambient temperatures and corrosive atmosphere. The unit consists of an all-stainless-steel chain and non-removable screws. The connection head contains a high temperature refractory terminal block. The head accomodates both conventional thermocouple wire elements, and metal-sheathed thermocouples featured in the company's line. Pressure-tight to 125 psi, the "head" series has a ¾-in. conduit outlet. (E. C. Smith Mfg. Co., Inc.)

For more data circle No. 28 on postcard, p. 107

Powdered Polyethylene Finds Many Uses

Finely-divided polyethylene is available in two basic forms. One is a solution-produced material with a smooth surface, and the other is a mechanically-ground material with an irregular shape and surface. Conventional paint-spraying equipment coats metal with polyethylene. This application uses the powdered polyethylene dispersed in alcohol. Other coating techniques, involving dry powder, and water dispersions can be used for coating metals. Other applications of the powder are: Wire and glass coatings, an additive in rubber to improve mold release, and producing of large plastic molds. (U. S. Industrial Chemicals Co.)

For more data circle No. 29 on postcard, p. 107

Coaxial Ignitron

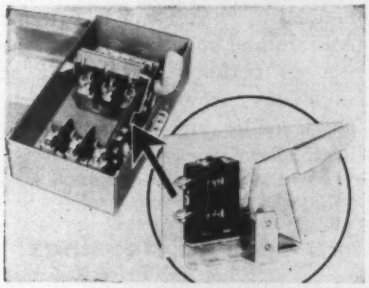
A coaxial ignitron controls high-peak currents as in resistance welding. A cathode terminal, at the top of the tube, permits coaxial flow of current, giving the tube added dependability. This cathode terminal enables the tube to control

high-current, short-duration pulses without damage from magnetic effects. The tube may also be used in capacitor discharge circuits. The ignitron handles peak currents as high as 1300 amp at peak voltages up to 1800 v. (General Electric Co.)

For more data circle No. 30 on postcard, p. 107

Interlock Kit

Because the interlock contacts make or break ahead of the main switch blades, a new interlock can be used within control circuits. Available in kit-form for all of the company's heavy - duty safety switches, the interlocks are supplied

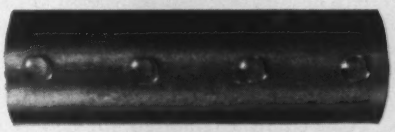


with one normally open and one normally closed contact. The handle of the safety switch actuates the interlock assembly. This insures continuous operation without the need for special linkages. The interlock utilizes standard three-pole switches from stock. The operating

ALLEN

Allenpoint's deep, full-circle bite assures tremendous resistance to removal torque! Stays tighter longer!

When you need a set screw that you can depend on to stay tight under heavy strain and vibrations, specify ALLENPOINT. Here's why you can always depend on ALLENPOINT: proper design of the cup diameter results in a rugged grip that makes the full-circle pattern you see here . . . deep, strong, clean sockets allow full wrenching leverage . . . and uniform Class 3A threads assure a tight friction lock over the entire length of Allenpoint Set Screws.



Ask your ALLEN Distributor for samples and full engineering details—he's always ready, willing, and able to give you prompt, practical service!

50 ANNIVERSARY YEAR ALLEN HEAD 1910-1960

ALLEN MANUFACTURING COMPANY

HARTFORD 1, CONNECTICUT, U.S.A.

mechanism is rated for heavy-duty service. (Square D Co.)

For more data circle No. 31 on postcard, p. 107

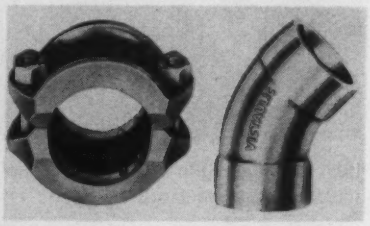
Copper-Clad Laminate

A new copper-clad, hot-punch, paper-base phenolic laminate is flame-retardant. It possesses good punching and electrical characteristics. These include high insulation resistance and surface resistivity in the base stock. The base stock is translucent and can be cold-punched to 1/16 in. in thickness. Maroon in color, it's furnished with a semi-gloss finish. The copper foil, on one or both sides, in either rolled or electrolytically-deposited form, has a minimum purity of 99.5 pct. Rolled foil is available in thicknesses of 0.0014, 0.0028 and 0.0042 in. Electrolytically - deposited foil comes in thicknesses of 0.0014 or 0.0028 in. (Taylor Fibre Co.)

For more data circle No. 32 on postcard, p. 107

Pipe Connecting

For use with plain- or beveled-end pipe, a pipe-connecting method consists of couplings and fittings. The couplings are designed with two bolts for fast, easy installation, and are fitted with hardened stainless-steel grips. The grips engage the pipe ends and securely lock



them together. An ordinary wrench seats the grips in the pipe or fitting ends. Light in weight, the couplings are ruggedly built for tough service conditions. The fittings are engineered with long radii, full-flow sweeps for good hydraulics and minimum friction loss. (Victaulic Co. of America)

For more data circle No. 33 on postcard, p. 107

Self-Wicking Bearings

Lifetime-lubricated sleeve bearings eliminate conventional oiler holes. Self-wicking lubricants are reported to be resistant to extreme moisture and cold conditions. The bearings perform satisfactorily at continuous temperatures up to 200°F under high loading conditions. (Permawick Co.)

For more data circle No. 34 on postcard, p. 107

Extra-Large Housings

Cast from aluminum, extra-large, explosion-proof housings have been tested at pressures up to 275,000 lb. Forces were exerted against the housing covers. These units will not rust, are non-magnetic, non-sparking and are light in weight. Their weight is about 1/3 that of cast iron. Flanged surfaces are

WAPAK SLITTERS

Photo courtesy of Stamco Inc., New Bremen, Ohio

SINCE 1891

Mirror Finish and ULTRA-KEEN EDGES reflect LOWER PRODUCTION COSTS

Longer continuous runs with less down-time are obtained with WAPAK Slitters and Rotary Shear Knives, because they're designed for high-speed cutting and trimming. Precision inspected by visual gage and profilometer.

Wapakoneta, one of the oldest and largest machine knife manufacturers in America, assures you of the exact heat treatment and grinding specified for your needs. Thickness and parallelism tolerances of .0002 or closer if required.

Use WAPAK MULTICUT for maximum production. WAPAK TUFCUT is engineered for shock-resistant cutting of heavy stock.

Export Div.: 30 Church St. New York 7, New York

WAPAK KNIVES

THE WAPAKONETA MACHINE CO., WAPAKONETA 11, OHIO

Knives Engineered for the Job Since 1891

SLITTER KNIVES • SHEAR BLADES • SCRAP CHOPPERS • HARDENED SPACERS • GIBS • HARDENED WAYS • ROCKER PLATES • WEARING PLATES • MACHINE LINERS

***Experience**—the added alloy in **Allegheny Ludlum** tool steels*

Careful addition of sulfur to melt guarantees typical sulfide distribution, as shown in photomicrograph of longitudinal specimen of EZ MACHINING tool steel.

Sulfur addition to melt held to narrow range in Allegheny Ludlum's EZ MACHINING GRADES

Uniform, finely-distributed sulfides mean uniform machining, uniform high finish, uniform long tool life order after order

Adding sulfur, actually an impurity, to a tool steel melt to make it free-machining must be done with care and precision. That's why Allegheny Ludlum maintains an extremely close average range in adding sulfur to its EZ MACHINING grades. But mere range, however narrow, is not enough. A-L has developed special techniques in adding sulfur and nucleating agents to produce the uniform, finely-distributed sulfides that characterize good free-machining tool steels.

A-L's extra care means you can standardize your machining operations from piece to piece and order to order. This reproducibility is reflected in uniform *machining;* uniform *high finish;* uniform *long tool life.*

For example, in the production of hobs these machining properties in Allegheny Ludlum's EZ MACHINING steels minimize the costly "backing off" operation for back clearance of multiple teeth, eliminating complicated extra heat treatment. Lower residual stresses are set up, because the steel has a lower resistance to the cutting action. Naturally, hobbing is only one of the situations where these free-machining characteristics can benefit you.

Allegheny Ludlum stocks a complete line of tool steel sizes and grades. Call your nearest A-L representative; you'll get quick service and counsel on such problems as heat treating, machining, grade selection, etc. Or write for A-L's publication list which gives full data on the more than 125 technical publications offered. They'll make your job easier.

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DESIGN DIGEST

ground flat to 0.0015 in., and do not utilize gaskets. (The Adalet Mfg. Co.)

For more data circle No. 35 on postcard, p. 107

Pressure Switch

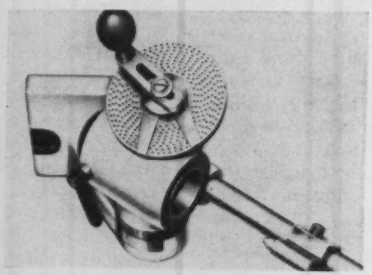
A sub-miniature, adjustable pressure switch exceeds the requirements of MIL-E-005272B for performance up to 200 psi under vibration, shock, and acceleration test conditions. The volume of the switch is less than 1 cu in., and

weighs slightly over 1 oz. An all-stainless-steel housing contains a pressure capsule and a snap-action switch. The switch is suited for electrical switching in response to pressure changes in gas or liquid. (The Bristol Co.)

For more data circle No. 36 on postcard, p. 107

Dividing Head

Designed for use in instrument and model shops, a versatile dividing head produces a wide variety of small precision parts, with a minimum of set up time and effort. Outstanding features are: minimum



overhang, maximum rigidity, and height and weight allowing head to be readily used on rotary tables or milling machines. The spindle locks in taper section for greater rigidity and elimination of journal clearance. (Falcon Machine & Tool Co.)

For more data circle No. 37 on postcard, p. 107

NEW BOOKS

"Zone Melting" by W. G. Pfann, contains all the information that a scientist, engineer or manufacturer needs to plan a zone-melting process—or to decide whether one is feasible. The author covers both theory and practice in a clear, readable manner. Thus, the book also serves as a good student text. . . . "Crystallization has important possibilities as a separation process which are yet to be realized," writes Mr. Pfann. His book spells out the potentials in this area and discusses techniques which are, as yet, largely unexploited. 236 pp. 127 illustrations. $7.50. John Wiley & Sons, Inc., 440-4th Ave., New York 16.

"Physical Metallurgy" by Bruce Chalmers, emphasizes the scientific, as opposed to the empirical and physical concepts. It's believed to be the first book on the subject, which incorporates the more recently introduced ideas—such as nucleation, dislocations, etc.—and the first book that develops physical metallurgy in terms of atomic processes and interactions. This illustrated book builds up a complicated physical framework; then, examines its validity by comparison with experiments. 468 pp. $12.50. John Wiley & Sons, Inc., 440-4th Ave., New York 16.

"High - Temperature Materials" by R. F. Hehemann and G. M. Ault. This book reports on a conference, on recent developments in high-temperature materials, which was held April 16-17, 1957, in Cleveland. Until recently, high-temperature materials were centered primarily around nickel- and cobalt-base alloys and cements. The initial sections of the book summarize the characteristics of these materials and the factors that control their performance. Since these materials, as developed to date, appear to be limited to temperatures below 2000°F, recent interest has shifted somewhat to refractory metals. The

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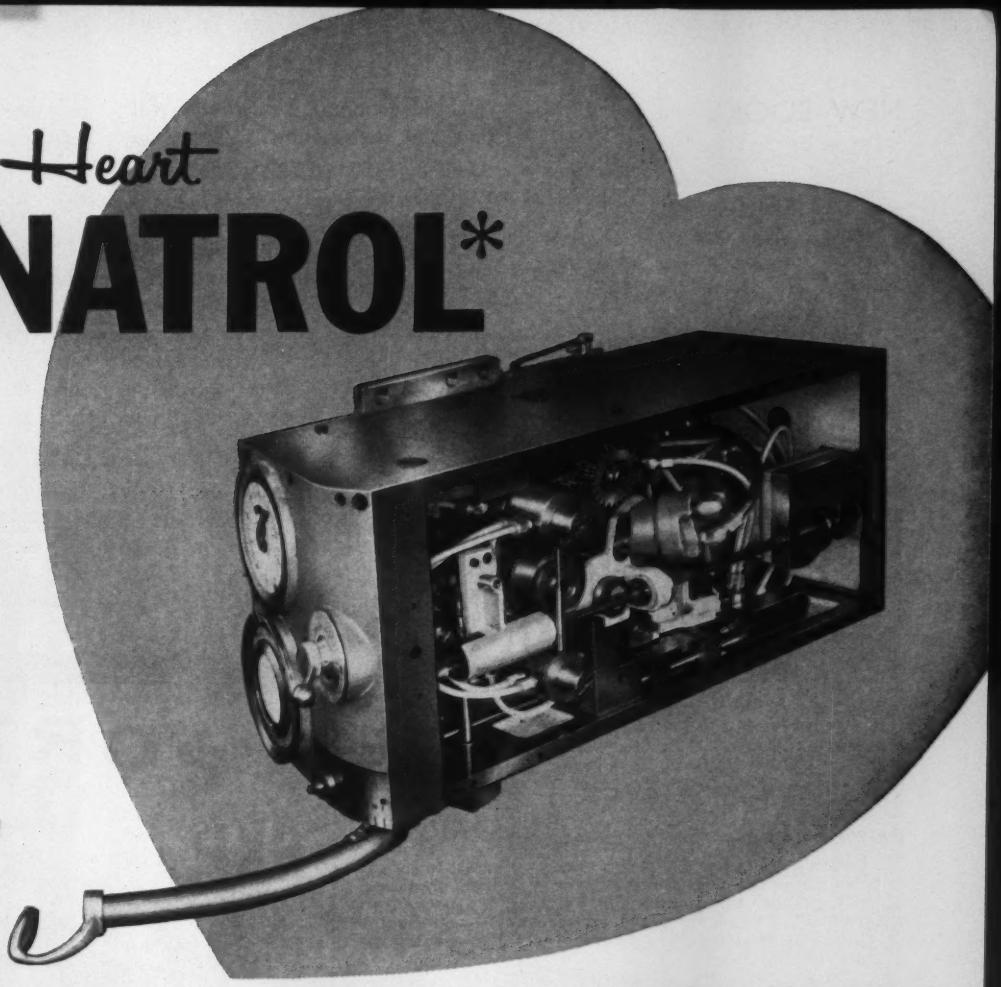
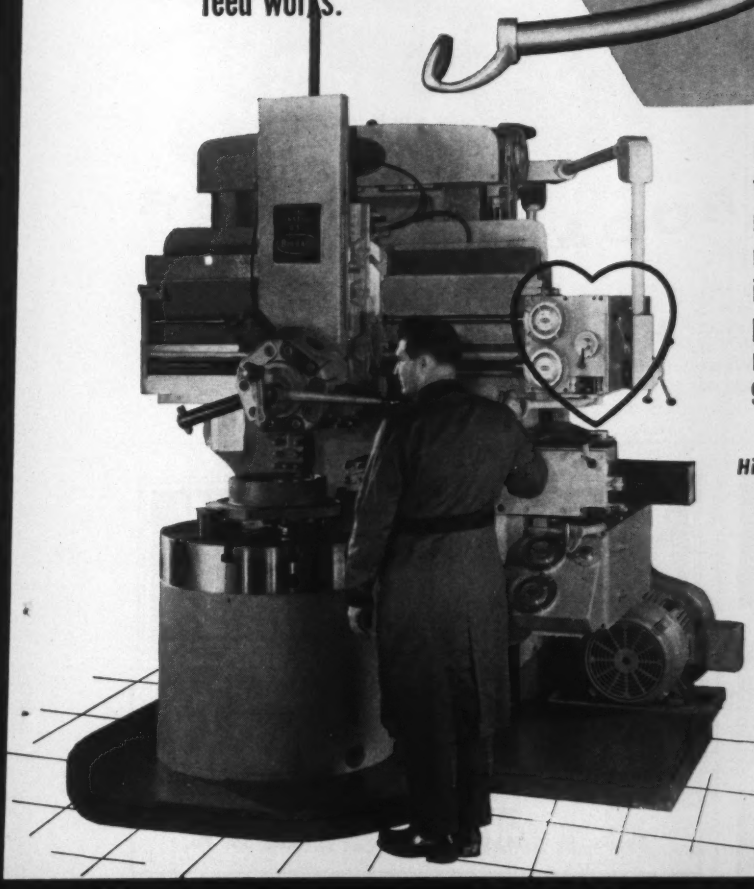


By means of a single lever or from a simple remote control all head motions, traverse and feed engagement are accomplished through this revolutionary new feed works.



Dynatrol* provides infinitely variable feed rates throughout the full range and variable traverse rates from zero to nine feet per minute. Feed rates may be advanced or retarded while the machine is cutting to obtain maximum tool performance and productivity. Ten sizes from 26" to 144" table diameter. Send to The Bullard Company, Bridgeport 9, Conn. for complete catalog.

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refractory metals, also discussed, are just beginning to receive the attention they deserve. 544 pp. $17.50. John Wiley & Sons, Inc., 440-4th Ave., New York 16.

"Sources of Commodity Prices" compiled by Paul Wasserman. Purchasing agents and business, financial and economic researchers will find this publication valuable in locating current commodity prices. It directs them to periodicals where current commodity prices are published—such as the steel prices which appear each week in The IRON AGE. More than 6800 commodities, from abalyn to fuel oil to millet to Zytel, are listed alphabetically. And there are extensive cross references. Coverage is limited to American and Canadian journals. 176 pp. $5.00. Special Libraries Assn., 31 East 10th St., New York 3.

"Elements of Reinforced Concrete" by S. P. Stern, features a good approach to the subject matter —combining both theory and practical applications. The book is aimed at architects, engineers and technicians, including those who are

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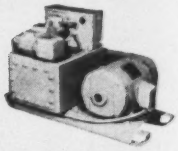

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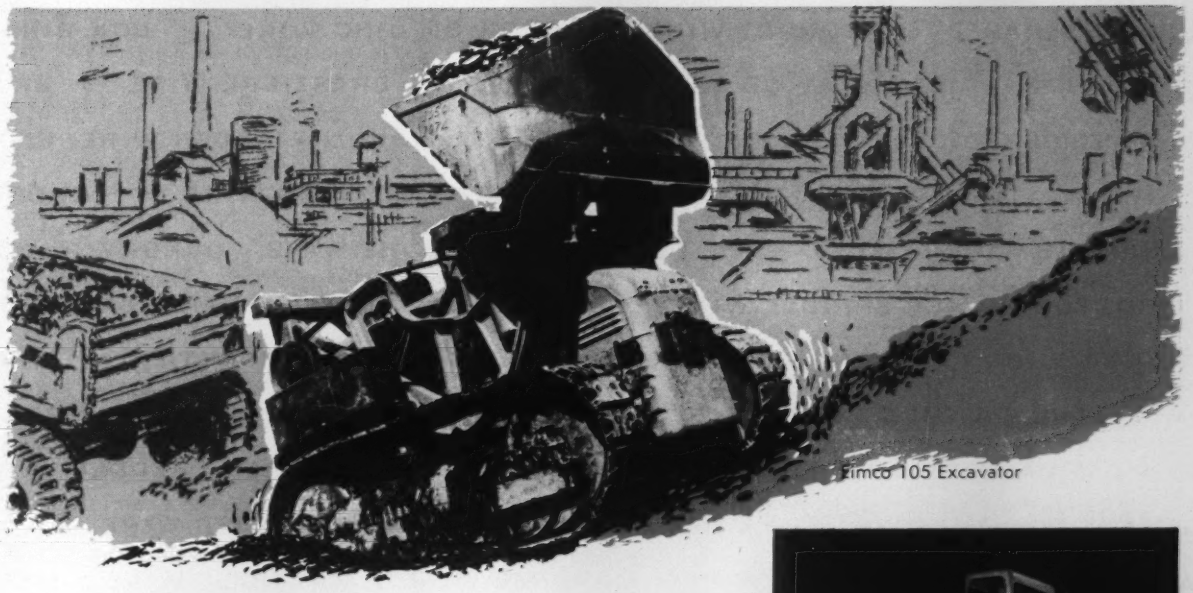

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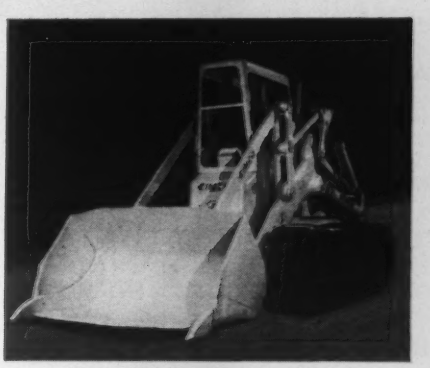

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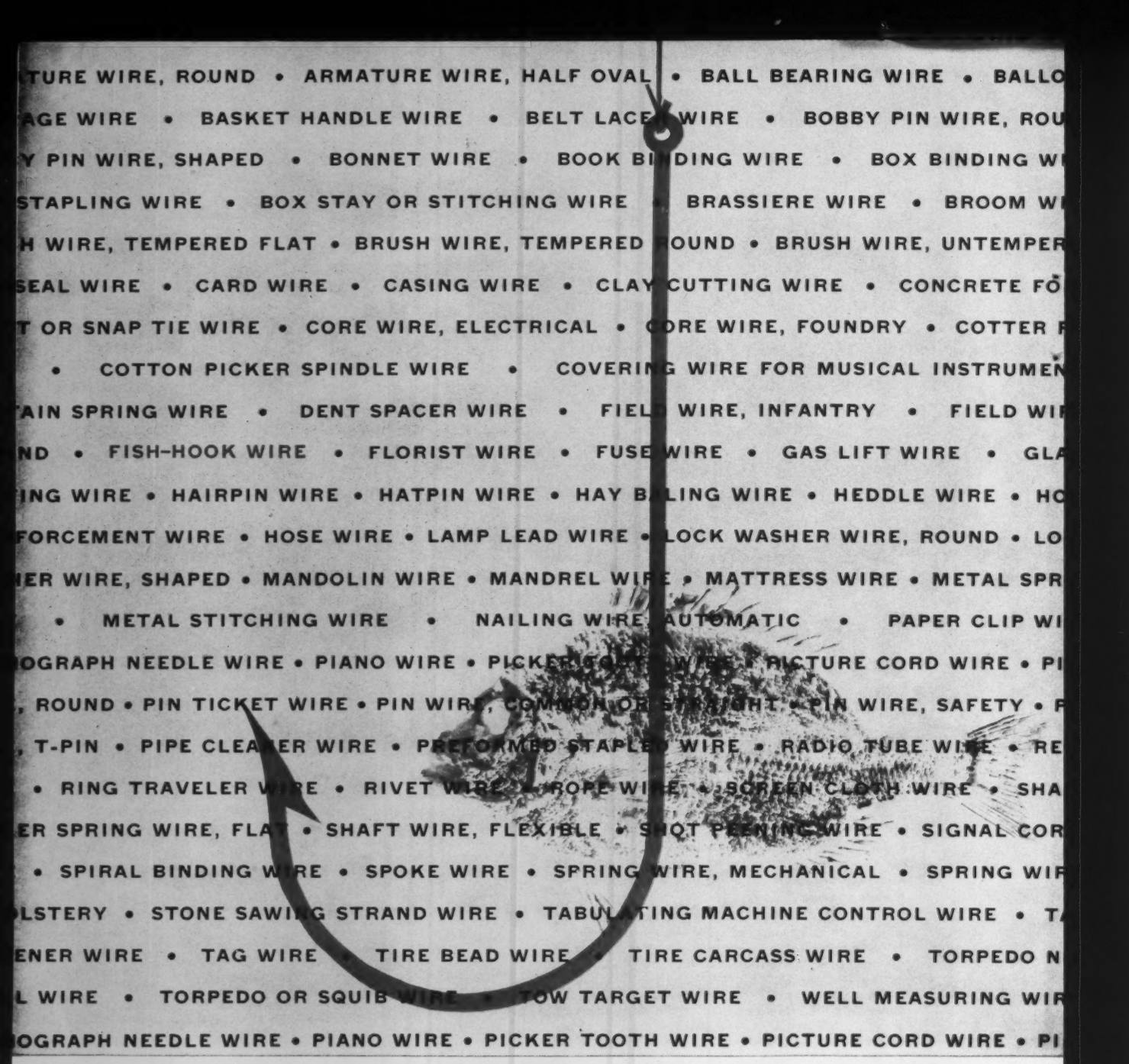
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STAPLING WIRE • BOX STAY OR STITCHING WIRE • BRASSIERE WIRE • BROOM WI
H WIRE, TEMPERED FLAT • BRUSH WIRE, TEMPERED ROUND • BRUSH WIRE, UNTEMPER
SEAL WIRE • CARD WIRE • CASING WIRE • CLAY CUTTING WIRE • CONCRETE FO
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preparing for civil service and professional examinations. The author brings the reader through a brief, yet full, review of mathematics and physics as they apply to construction engineering. This step-by-step development enables the reader to visualize and learn each process and procedure in logical sequence. 444 pp. Prentice-Hall, Inc., Englewood Cliffs, N. J.

"Hot Organic Coatings" by R. B. Seymour, presents—in concise form—the constitutions, applications and properties of hot organic protective coatings. Chapters on widely used hot organic materials such as asphalt, coal-tar pitch, petroleum waxes and cellulose derivatives are covered in a clear, well written manner. Additional chapters deal with hot-melt applications such as peel coatings, protective linings, flame spraying and the fluidized-bed process. 233 pp. $7.50. Reinhold Publishing Corp., 430 Park Ave., New York 22.

"A Technical Writer's Handbook" by Margaret Norgaard. This book offers help to engineers, scientists, businessmen and government workers on writing clear and colorful reports. It contains valuable information, but the arrangement of the data leaves something to be desired. An established technical writer will find the basic information useful—but will not consider the book a ready reference. 241 pp. $3.75. Harper & Brothers, 49 East 33rd St., New York 16.

"Handling and Treatment of Iron Ores" is a special report (No. 65) from The Iron and Steel Institute in Great Britain. Ore handling facilities around the world, including installations in the United States and Canada, are discussed. Schematic diagrams and illustrations round out a well written text. 128 pp. The Iron and Steel Institute, 4, Grosvenor Gardens, London, S.W.1.

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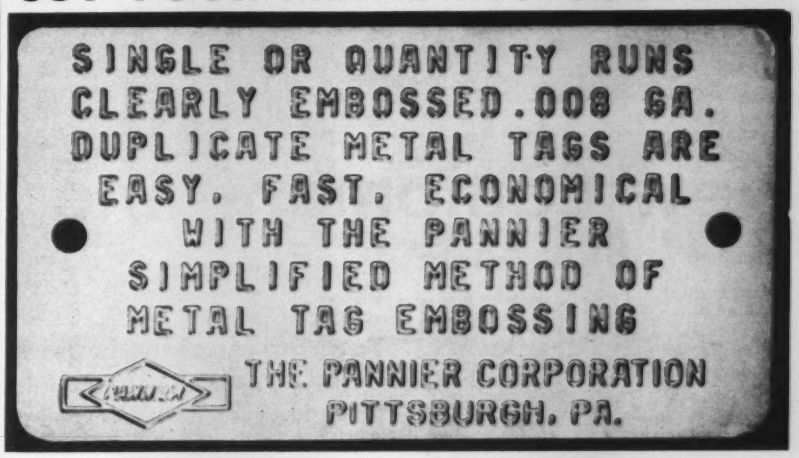

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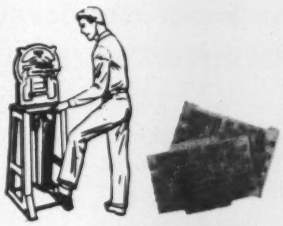
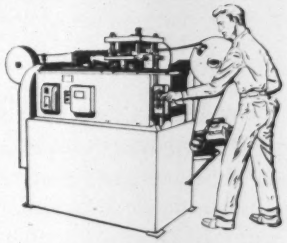
Whether you use embossed metal tags in large, production quantities — or just a few, occasional tags — Pannier simplified embossing equipment is engineered to provide your metal tags at the lowest possible cost, greatest safety and easiest readability. Inexperienced help can operate any of the machines, large or small.



One to four tags at a time (model 344)

Model 344 Pannier Embossing Machine has two uses. It can emboss up to 4 duplicate tags, like that pictured above, in sizes up to 3" x 5½" or longer, at one operation (one letter at a time).

This same machine provides the low cost, matched male and female embossing matrices (shown at left) for use with Model 207. Paired, these two machines provide complete equipment for volume tag production.



Volume Tag Production (No. 207)

The Pannier Master Marker Embossing Machine, Model No. 207-H-6 automatically produces up to 60 duplicate tags per minute, employing coils of Pannier Safety Tag stock. These tags, in strip form, are nicked and notched for easy detachment from the coiled strip. Embossing impression is made by inexpensive male and female metal matrices—that cost only a fraction of type-and-matrix methods. The machine operates by start-stop pushbutton control. Fingers never approach the embossing area.

For single, occasional tags

Pannier engineering provides a wide range of Master Marker Embossing Machines to suit any quantity requirement. This small hand-held Embosser makes individual tags on half-inch strip metals or vinyl plastic.

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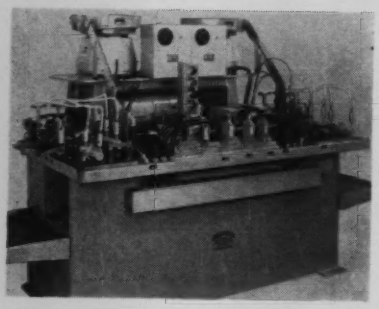
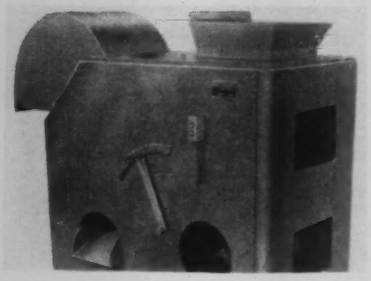


Tapping Machine Provides All-Productive Motions

Giving a solution to the problem of production time-loss, an automatic tapping machine features tapping operation at one station, coincident with withdrawal at the opposite end. There is no waste motion with an automatic hopper. A welded base contains electrical controls, coolant pump, reservoir, chip and work receptacles. Applications for a machine of this type are limited to certain classes of volume production work. Operations successfully performed are: electrical lock nuts, drawn-steel tee nuts, and odd-shaped parts. (The Bodine Corp.)

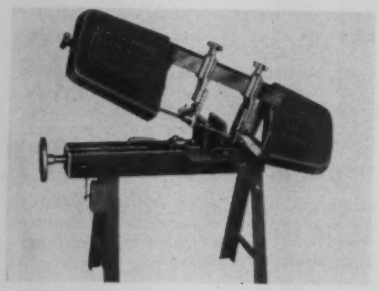
For more data circle No. 61 on postcard, p. 107



Machine Separates Screw Parts from Scrap Chips

Equipped with an automatic feeder-vibrator unit, machine separates 1¼ cu ft of screw machine parts from scrap chips, in one minute. Over 50 graduated settings regulate the self-contained blower unit to provide the control of air. The parts may range in size from 1/16 to 2 in. diam, and from ¼ to 6 in. in length. The part and chip mixture, with cutting oils removed, is dumped into the top hopper from which the material is fed, shaken, and separated. (The McKenzie Engineering Co.)

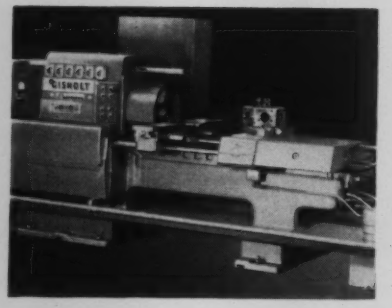
For more data circle No. 62 on postcard, p. 107



Band Saw Features Rigid Construction

A specially designed, welded band frame and band cover provide a strong, rigid, horizontal, metal-cutting band saw. It has a cutting capacity of 6 x 10 in. The unit contains a ⅓-hp motor providing blade speeds of 60, 90, and 120 fpm. A quick-action vise turns 45 degrees for angle cutting with a capacity of 5 x 6 in. The cutting head, locked in a vertical position, does slotting and notching operations. The machine is 34 in. high, 46 in. wide, and 18 in. in depth. (W. F. Wells & Sons, Inc.)

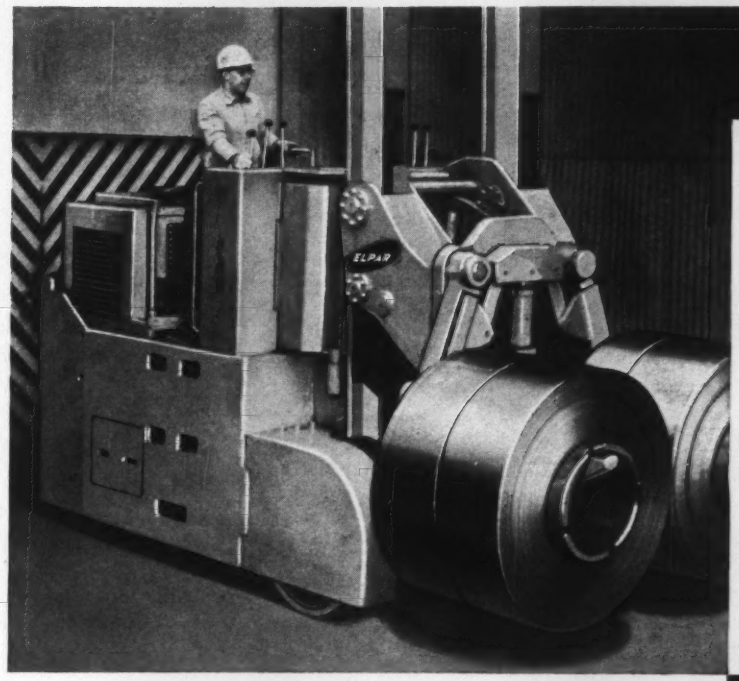
For more data circle No. 63 on postcard, p. 107



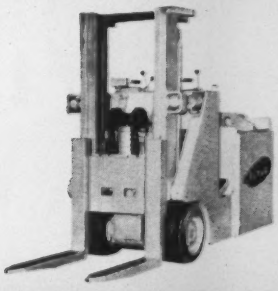
Automatic Turret Lathe Offers Faster Set Up

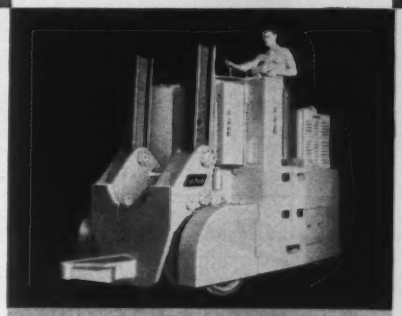
The combination of fast, easy set up, with completely automatic operation, gives economy on job lots and long-production runs. The operator needs only to chuck the work, start the automatic cycle, and remove the completed part. The toggle-switch electrical panel cuts time by permitting pre-selection of machine functions and speeds. Another time reducer is a meter-out hydraulic-control system that allows pre-selection of feeds for each hexagon turret station. Operating controls are grouped on an angle-mounted panel at the left of the chuck. (Gisholt Machine Co.)

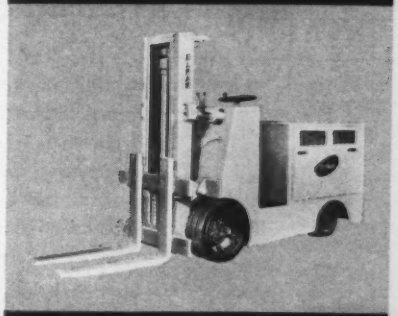
For more data circle No. 64 on postcard, p. 107



ELPAR
FORK AND RAM TRUCKS







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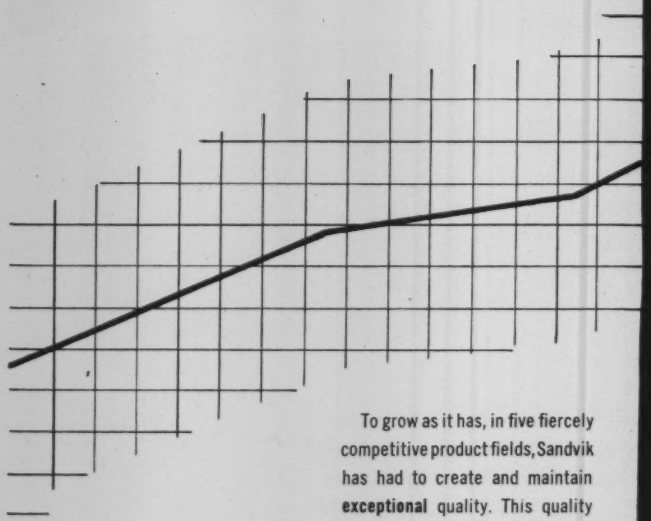
Extraordinary QUALITY

Major Reason For SANDVIK'S GROWTH



. . . in SPECIALTY COLD ROLLED SPRING STEELS, WIRE AND TUBING
. . . in STEEL BELT CONVEYORS AND PROCESSING UNITS
. . . in COROMANT CARBIDE TOOLING
. . . in POWER SPRINGS
. . . in HAND SAWS AND TOOLS

To grow as it has, in five fiercely competitive product fields, Sandvik has had to create and maintain **exceptional** quality. This quality proves itself in outstanding and consistent performance. And, it is this performance which has earned, held and increased Sandvik's customers.

SANDVIK STEEL, INC.

SANDVIK

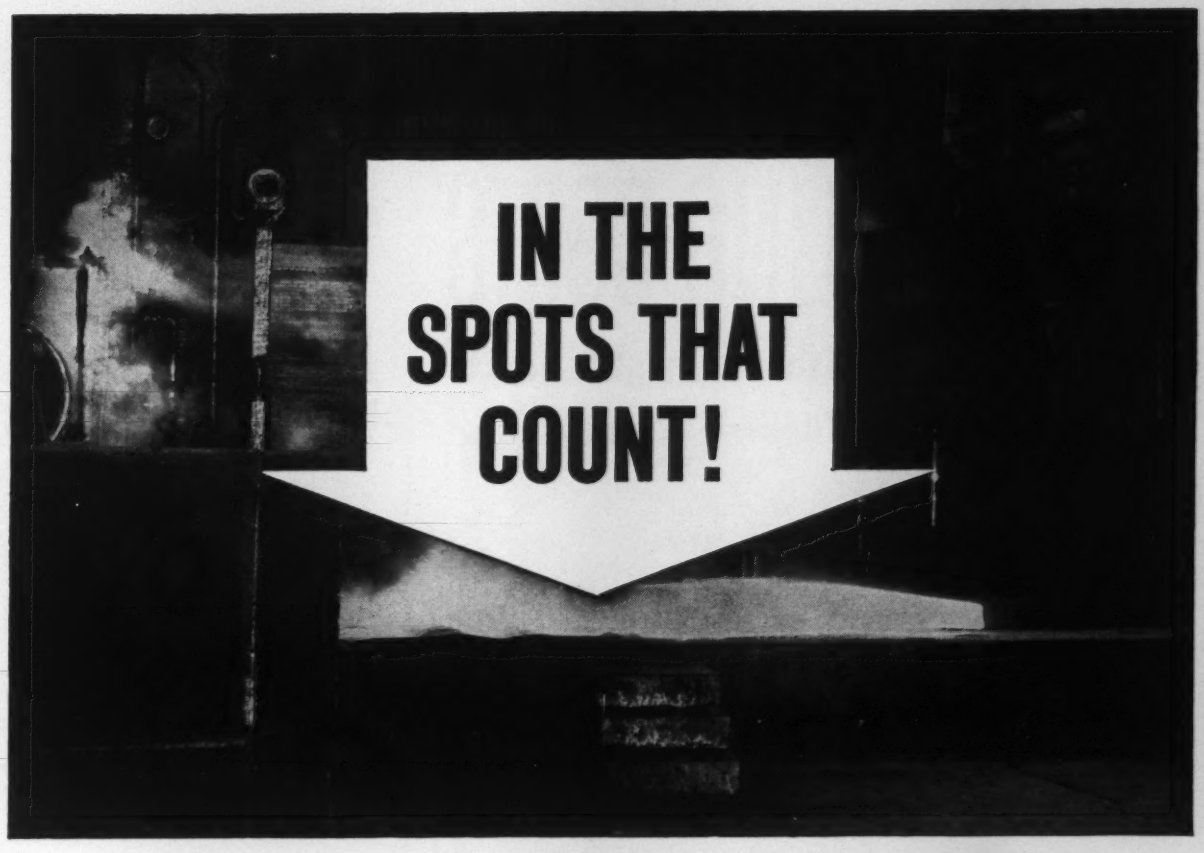
1702 Nevins Road, Fair Lawn, N. J.
SWarthmore 7-6200 • In N. Y. C.
ALgonquin 5-2200

Branch Offices: Cleveland • Detroit
Chicago • Los Angeles

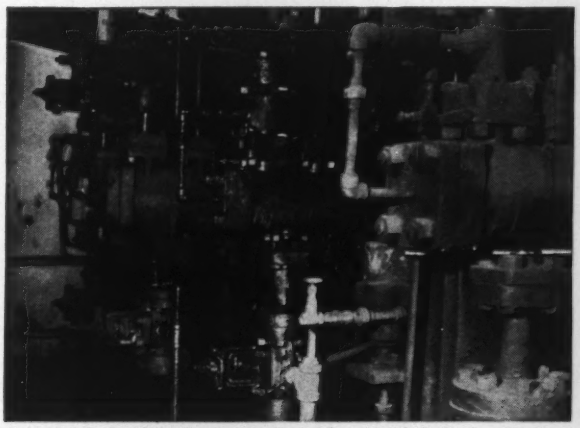
SANDVIK CANADIAN LTD. • P.O. Drawer 1335, Sta. O., Montreal 9, P. Q.

Works: Sandviken, Sweden

SS-202



split-second control with Homestead® Operating Valves keeps steel plate rolling!



Solenoid-hydraulic pilot controlled 4" and 2½" Hydro-Cushion Homestead Operating Valves; and Lever-Seald Hydraulic Stop Valves; 800 pounds working pressure.

Six days a week, twenty-four hours a day, 250 times an hour, the tilt tables and middle roll of an East Coast Plate Mill are exactly positioned without shock, and held without creepage, by Homestead Operating Valves. This precision control has permitted record-breaking rolling of the hot steel slabs into plate.

Through more than *three and one-half million* split-second rollings during the two years the 2½" and 4" Hydro-Cushion Homestead Operating Valves have been in service, not one shutdown has been required for valve maintenance! Performance records such as these, are assured by the protected seat and cushioning action of the Homestead Valves.

For any hydraulic control problem, there is a Homestead Operating Valve to meet your needs. Send today for Reference Book 39-6.

Please send Reference Book 39-6 and prices on all types of Homestead Operating Valves. 23

Name.....Title.....

Company.....

Address.....

City.....Zone.....State.....

hv

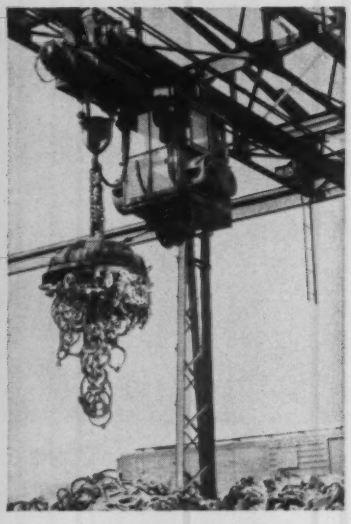
HOMESTEAD VALVE MANUFACTURING COMPANY
P. O. Box 23, Coraopolis, Pennsylvania

SHEPARD NILES
HOISTS

CUT HANDLING COSTS

in YOUR plant with the right hoist

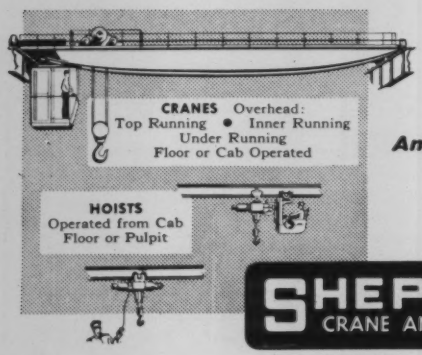
FLOOR-OPERATED HOIST
Operator primarily occupied with other duties, uses hoist for fast, efficient short hauls.



CAB-OPERATED HOIST
Cab operator moves loads at high speeds, can quickly spot material for handling.

WHICH Shepard Niles hoist fits your plant's needs . . . a floor-operated hoist where the operator is freed for other duties or a cab-operated hoist where the operator is engaged full time moving loads through the air? Shepard Niles manufactures both types in capacities from 1 to 20 tons.

Send for the descriptive bulletins on both Cab and Floor Operated Hoists . . . or ask that a Shepard Niles representative call — there's NO OBLIGATION.



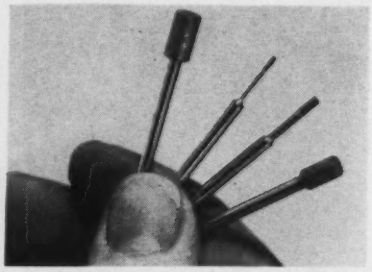
Building
America's Most Complete Line of Cranes and Hoists Since 1903

SHEPARD NILES
CRANE AND HOIST CORPORATION
1495 Schuyler Ave., Montour Falls, N.Y.

NEW EQUIPMENT

Diamond Pins

Ideally suited for jig grinding, internal grinding of small holes, and other precision grinding operations, diamond pins offer close tolerances at production rates. Used on hardened steel, ceramics, and carbides, the pins consist of diamond grains permanently bonded to hardened



steel shafts. The bond is accomplished by a special process which insures maximum service life and economy. Never needing dressing, the pins are available from 0.020 to 0.250 in. in diam. Two grit sizes are available, 200/240 and 80/100. (Titan Tool Supply Co., Inc.)

For more data circle No. 65 on postcard, p. 107

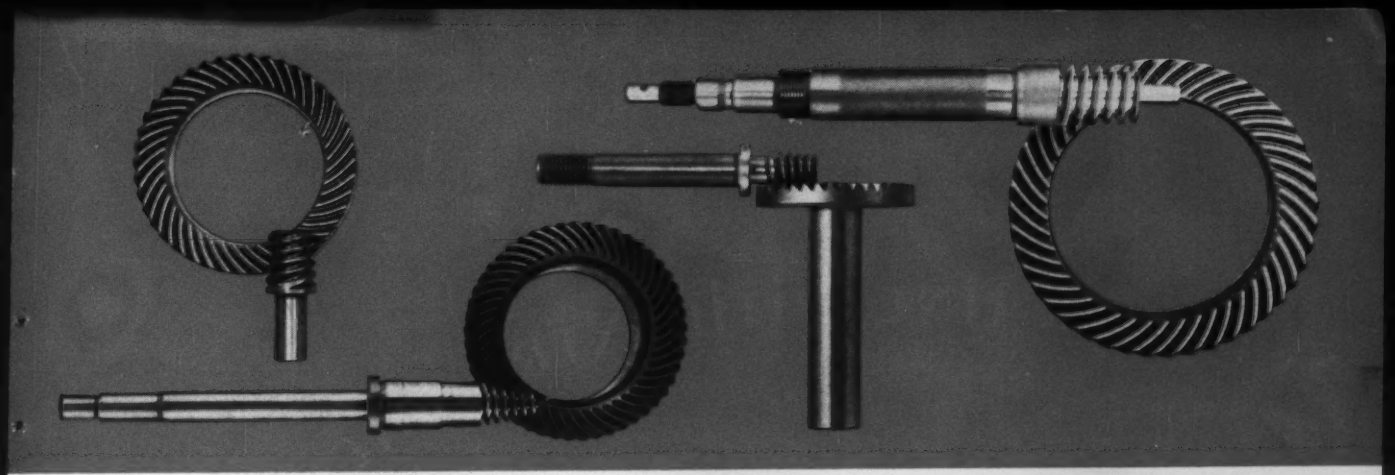
Punches

A new line of punches includes 58 specific-point diameters. Conforming to A.S.T.E. standards for heavy-duty, head-type punches, the punches have shank diameters within the "fractional" punch size range of 3/16 to 1 in. The tools are recommended for tapping and clearance hole making, rivet, or stud holes; with additional point sizes for plating allowance, slip or press fit of mating parts. (Dayton Perforators, Inc.)

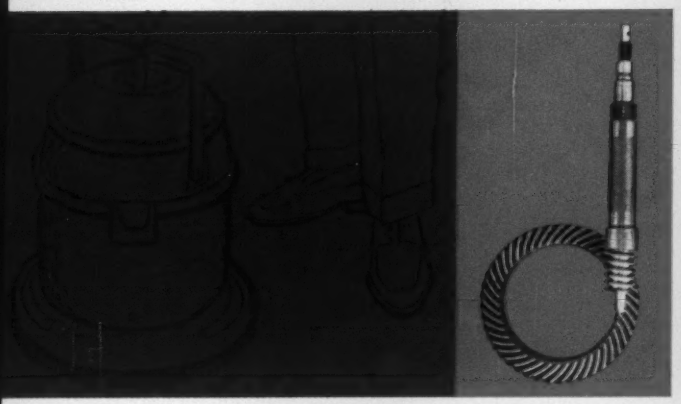
For more data circle No. 66 on postcard, p. 107

Platinum Coatings

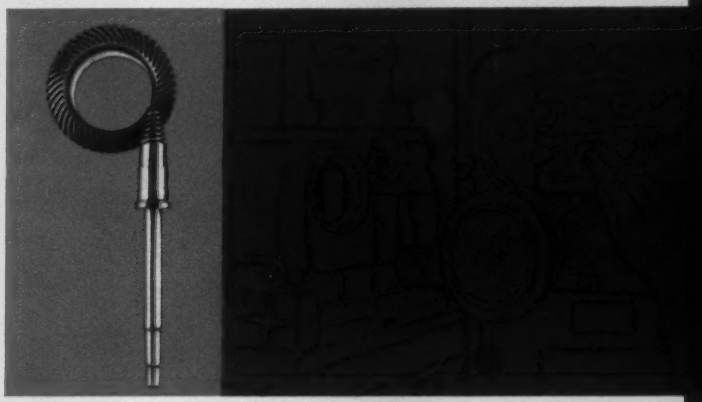
An alloy of platinum—with 0.5 pct rhodium—is clad to corrosion-resistant, high-nickel, chromium-content stainless steel. The platinum alloy and the stainless steel are inseparably clad by a bond of the same nature as the metallic bond that gives solid metals their strength. This is accomplished by a



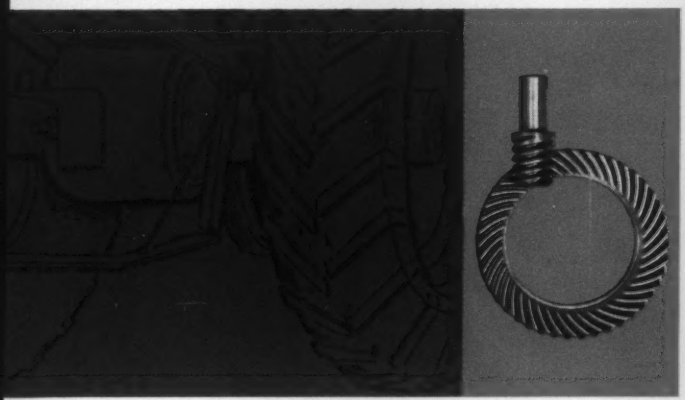
WHICH OF THESE HIGH-RATIO HYPOIDS IS "JUST RIGHT" FOR YOUR PRODUCT?



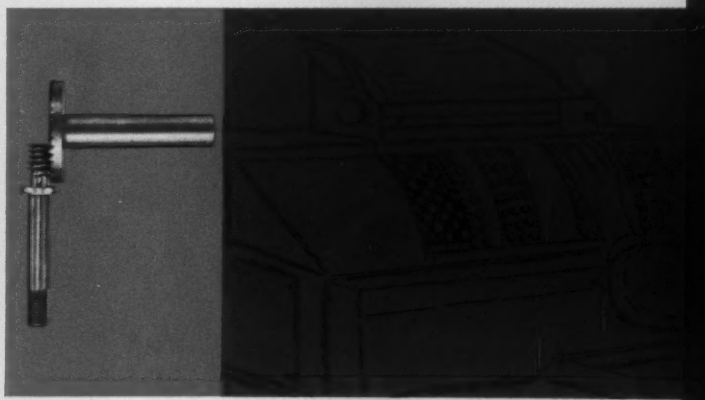
For hand tools. Where space is a problem—as in portable tools like this one—the high offset lets you design a more compact unit. Choose just the offset to solve your design problem with a more flexible, more compact unit than the corresponding worm and wheel.



. . . or machine tools. This high-offset pair lets you combine high reduction with strength, compactness and other advantages you might find profitable in designing machine tools. High-ratio hypoids can be produced on Gleason equipment for ratios of 1:10, 1:40 or even higher.



Big and strong. Where you need strength—as in farm machinery—high-offset hypoid pinions (with teeth which tend to "wrap around") are larger and stronger than corresponding bevel pinions. An extended shank on cylindrical pinions makes very rigid straddle mountings practical.



. . . or small and smooth. For smooth operation—as in office equipment that must run quietly—high-offset pairs provide smooth, quiet tooth action. Because teeth "wrap around" the pinion, you get continuous action—even with just one or two teeth! Grinders are available for applications requiring precision finish.

High-offset or high-ratio hypoids can be cut, tested, and quenched on the same Gleason equipment that is used on more familiar spiral bevel and hypoid gears. You can get more information about Gleason high-ratio hypoid gears by writing for free literature. Submit your prints for recommendations.

GLEASON WORKS

1000 UNIVERSITY AVE., ROCHESTER 3, N.Y.

SET YOUR LINE WITH EXTRA SALES-BAIT...

APPLIANCES • FARMYARD PRODUCTS • AUTOMOTIVE PARTS • BUILDINGS

Today's value-minded consumers demand products that give bonus years of useable service. That's why merchandising-minded manufacturers of appliances, farm equipment, automotive parts, metal buildings, and other products where corrosion-resistance is of prime importance, are using TI-CO galvanized sheets and their brand acceptance as a *plus sales feature.*

This is because TI-CO has earned the reputation of being a quality standard. This durable, uniform galvanized sheet gives your product components assurance of long life . . . helps them fulfill their original function and keep their fine appearance longer. Whether your product calls for deep-drawing, spinning, punching, crimping, perforating, Pittsburgh lock-seaming . . . *you won't flake TI-CO!*

Use the TI-CO brand, indicating *proven corrosion-resistance,* to provide an important competitive edge whether you're selling a component or a finished product.

INLAND STEEL COMPANY

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use TI-CO® galvanized steel sheets

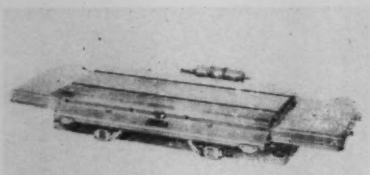
INLAND

solid-phase bonding process. Platinum-clad stainless strip can be rolled in thicknesses from 1/16 to 0.005 in. and in widths up to 12 in. (Metals & Controls Div., Texas Instruments Inc.)

For more data circle No. 67 on postcard, p. 107

Indexing Slide Table

Two working positions are provided by a cylinder-powered, indexing slide table. Slide movement is powered by a 3-in. bore air cylinder or a 2-in. bore cylinder.

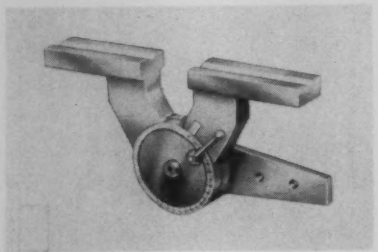


Stroke length is infinitely adjustable from 1 to 15 in. by means of hydraulic cushions and stops. Working surface of the top slide table measures 30 x 12 in. Two longitudinal slots, spaced 6 in apart, are provided with longitudinal ⅝-in. bolt T-slots. (Russell T. Gilman, Inc.)

For more data circle No. 68 on postcard, p. 107

Holders and Clamps

Work holders and clamps, used for short-run welding, soldering, and brazing, position and hold pipes, rods, tubes, plate bars, and other structurals for in-shop or on-the-job joining. One, of three different type holders, has clamping

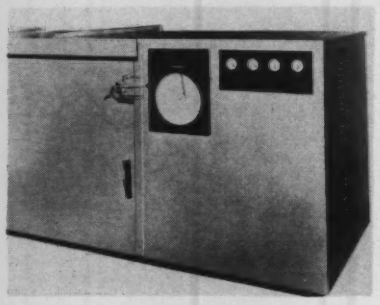


faces that can be set at any angle from 0° to 180°. This is done by means of a calibrated dial and single, quick-opening, quick-locking handle. A right-angle type and a straight-type holder complete the line. The frames of the holders are made of high-strength aluminum alloy. All clamping surfaces are precision machined. (Wales-Strippit, Inc.)

For more data circle No. 69 on postcard, p. 107

Environmental Chamber

Designed for fast process and stabilizing of metal alloys such as AM-350 stainless steel, molybdenum, titanium and tantalum, a low-temperature environmental chamber has a temperature range of ambient to —140°F. Refrigeration capacity is enough to lower the temperature of 300 lb of steel from +80° to —125°F in 60 minutes. (Webber Mfg. Co.)



For more data circle No. 70 on postcard, p. 107

Stock-Bore Couplings

A low-cost line of couplings accomodate three stock-bore ranges. The ranges are: stock bores from ⅜ through ¾ in., stock bores from ½ to 1 in., and stock bores from ⅝ to 1⅛ in. At 1750 rpm, peak horsepower ratings are 1.5, 3.0, and 6.0 hp, respectively. The flanges are cast from zinc alloy, having a tensile strength of 41,000 psi. The couplings have only three components: two cast flanges, and a one-piece rubber sleeve. Larger couplings are fitted with demountable bushings. (T. B. Wood's Sons Co.)

For more data circle No. 71 on postcard, p. 107

Stainless Gage Blocks

Stainless-steel gage blocks offer industry continued accuracy and much longer life than conventional blocks. Successful production of these gage blocks results from a long search for the most practical gage block material. They are used in exactly the same way as the sets

ASARCO

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LEXINGTON 9-1906
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HUBBARD 2-1737
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Copper & Brass Sales, Inc.
FOREST 6-6200
Meier Brass & Aluminum Co.
JORDAN 6-3902
Grand Rapids
Copper & Brass Sales, Inc.
EMPIRE 1-6681
Kalamazoo
Bard Tool and Equipment Co.
FIRESIDE 3-2691
Lansing
Superior Brass & Aluminum Co.
IV 2-2754
Muskegon
Towne Hardware & Supply Co.
2-2651
MINNESOTA
Minneapolis
R. G. Eide, Inc.
FE 8-4846
MISSOURI
Kansas City
Associated Bearings Co.
VALENTINE 1-5393
Hubbell Metals, Inc.
BALTIMORE 1-7760
St. Louis
Hubbell Metals, Inc.
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NEW JERSEY
Carlstadt
E. A. Williams & Son
GENEVA 8-0800
MARKET 31929
(New York LA 4-9546)
Newark
Federal Foundry Sales, Inc.
MARKET 2-6330
Perth Amboy
Gregg's Brass Foundry
HILLCREST 2-2086
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STERLING 8-1144
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Kencroft Associates, Inc.
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RIVERSIDE 2020
Rochester
Ontario Metal Supply, Inc.
HAMILTON 6-1630
Syracuse
Meloon Bronze Foundry, Inc.
GLENVIEW 4-3231
Troy
The Troy Belting & Supply Co., Inc.
AS 2-4920 (in Albany 3-6121)
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Memphis Bearing & Supply Co.
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Nashville
Dixie Bearings, Inc.
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TEXAS
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Standard Brass & Mfg. Co.
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Standard Brass & Mfg. Co.
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Federated Metals Canada, Ltd.
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Scarborough, Ontario
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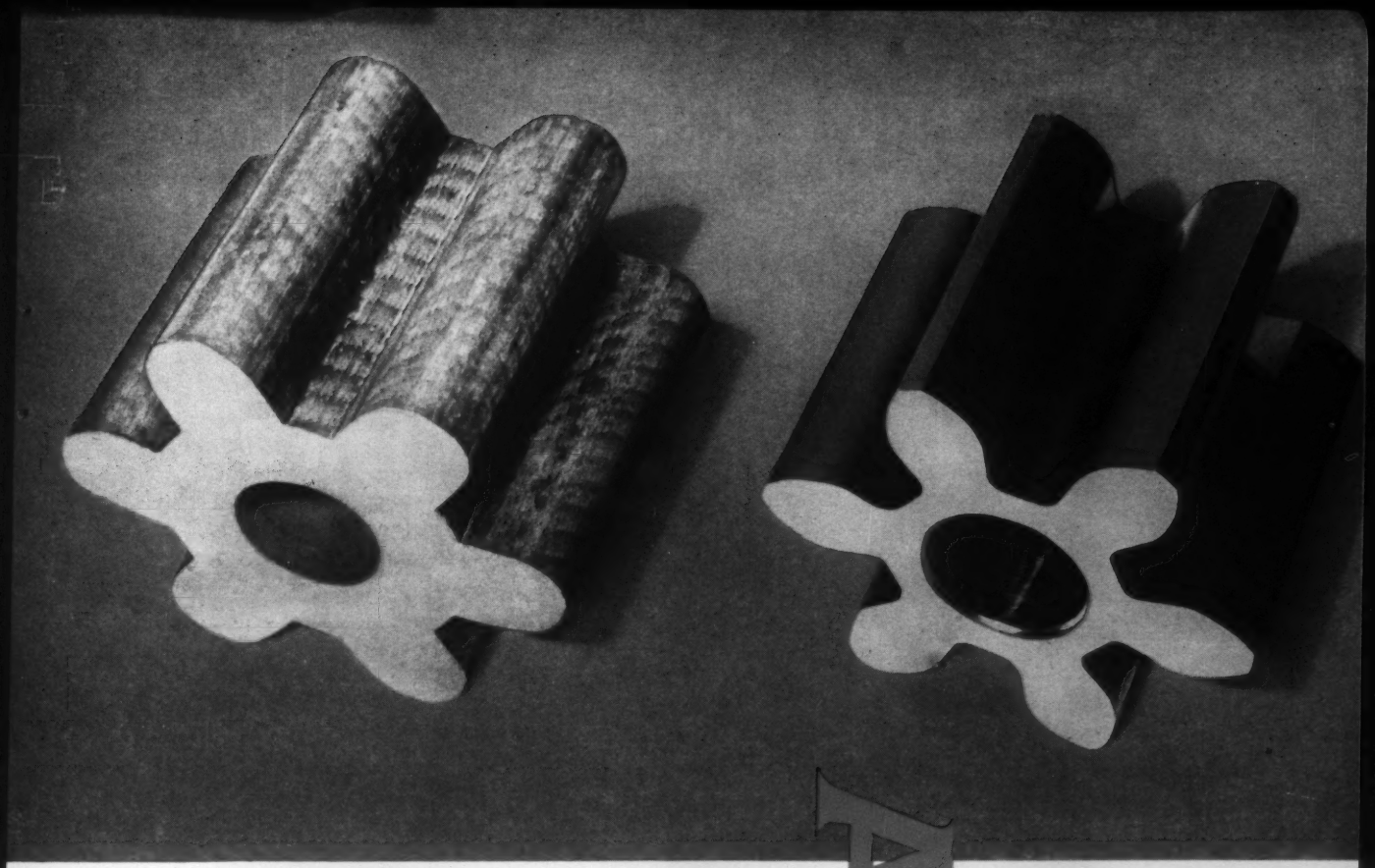


Note minimum clean-up necessary between casting of this 6-tooth pump impeller and finished part. (Illustrated parts are 4" in diameter.)

Custom shapes in continuous lengths:

ASARCON®

CONTINUOUS-CAST BRONZE CASTINGS

Before you design or produce a copper base alloy part, investigate the economy and efficiency of Asarco continuous casting. You can order the alloy and shape you need, in the exact lengths you need. Continuous Cast Asarcon Bronze alloys meet SAE, ASTM, and government specifications—but they are superior to the same alloys cast other ways, in hardness, yield, tensile and impact strength. In fact, you may be able to substitute an Asarcon Bronze for an aluminum or manganese bronze. Write for complete data to Continuous-Cast Department, American Smelting and Refining Company, Barber, N. J. or Whiting, Indiana.

Immediately available from stock: **ASARCON 773 BEARING BRONZE** (SAE 660)—260 sizes of rods and tubes. Complete range of sizes from ½" to 9" diameters. Immediately available from stock in 105" lengths. Special shapes produced to order.

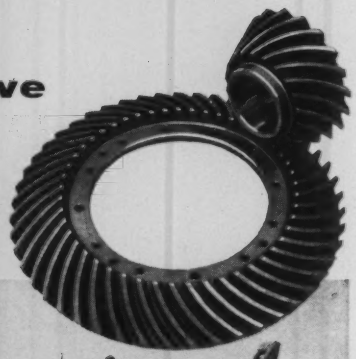
ASARCO

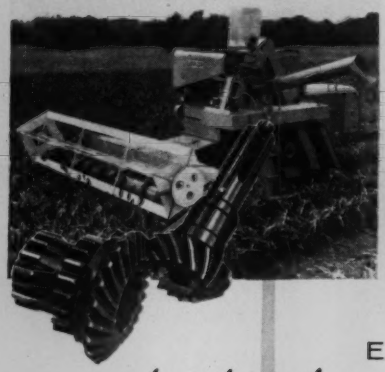
AMERICAN SMELTING AND REFINING COMPANY

CONTINUOUS CAST DEPARTMENT

West Coast Distributor: Kingwell Bros., Ltd., 457 Minna Street, San Francisco, Calif. In Canada. Federated Metals Canada, Ltd., Toronto and Montreal. Distributors in many principal cities.

GEARS to drive newest machines...





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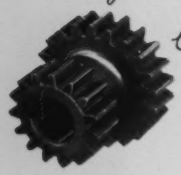
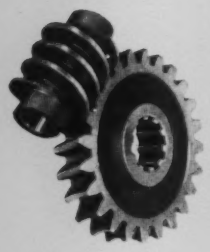
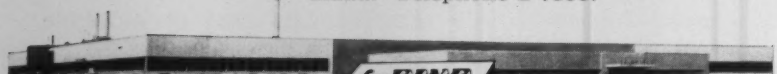




Getting into production on new models and new machines often calls for quick action to meet desired time schedules. FAIRFIELD CAN HELP YOU!

As one of America's largest independent producers of GEARS and DIFFERENTIALS, Fairfield's facilities are complete. You get the benefits of newest high capacity machines coupled with regular big volume output in an ultra-modern plant designed exclusively for producing fine gears EFFICIENTLY, ECONOMICALLY. Check with Fairfield NOW on your gear requirements. *Call or write.* FAIRFIELD MANUFACTURING COMPANY, INC., 2319 S. Concord Rd., Lafayette, Indiana. Telephone 2-7353.



Gears and Differentials for FINE GEARS *Made to Order for:*

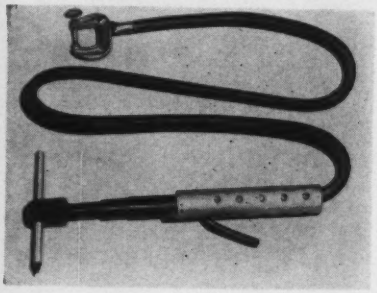
TRACTORS • HEAVY DUTY TRUCKS • AGRICULTURAL MACHINERY • POWER SHOVELS AND CRANES
MINING MACHINES • ROAD GRADERS • BUSES • STREET SWEEPERS • INDUSTRIAL LIFT TRUCKS

they replaced, except that they are not oiled, greased or protected in any manner. Tests prove the stainless-steel blocks are superior in each of nine categories used for gage-block evaluation. (The DoALL Co.)

For more data circle No. 72 on postcard, p. 107

Carbon-Arc Burner

Easily carried in a mechanic's tool box, a carbon-arc lead burner makes emergency, on-the-job repairs to industrial storage batteries and for general heating jobs. Power for the electric burner comes from

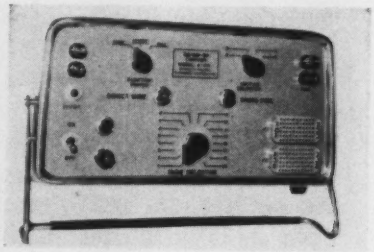


the battery being repaired (if sufficiently charged), or from an ordinary automotive battery. Convenient spring lever on handle releases clamp holding carbon rod, for quick interchange of elements. (Exide Industrial Div., The Electric Storage Battery Co.)

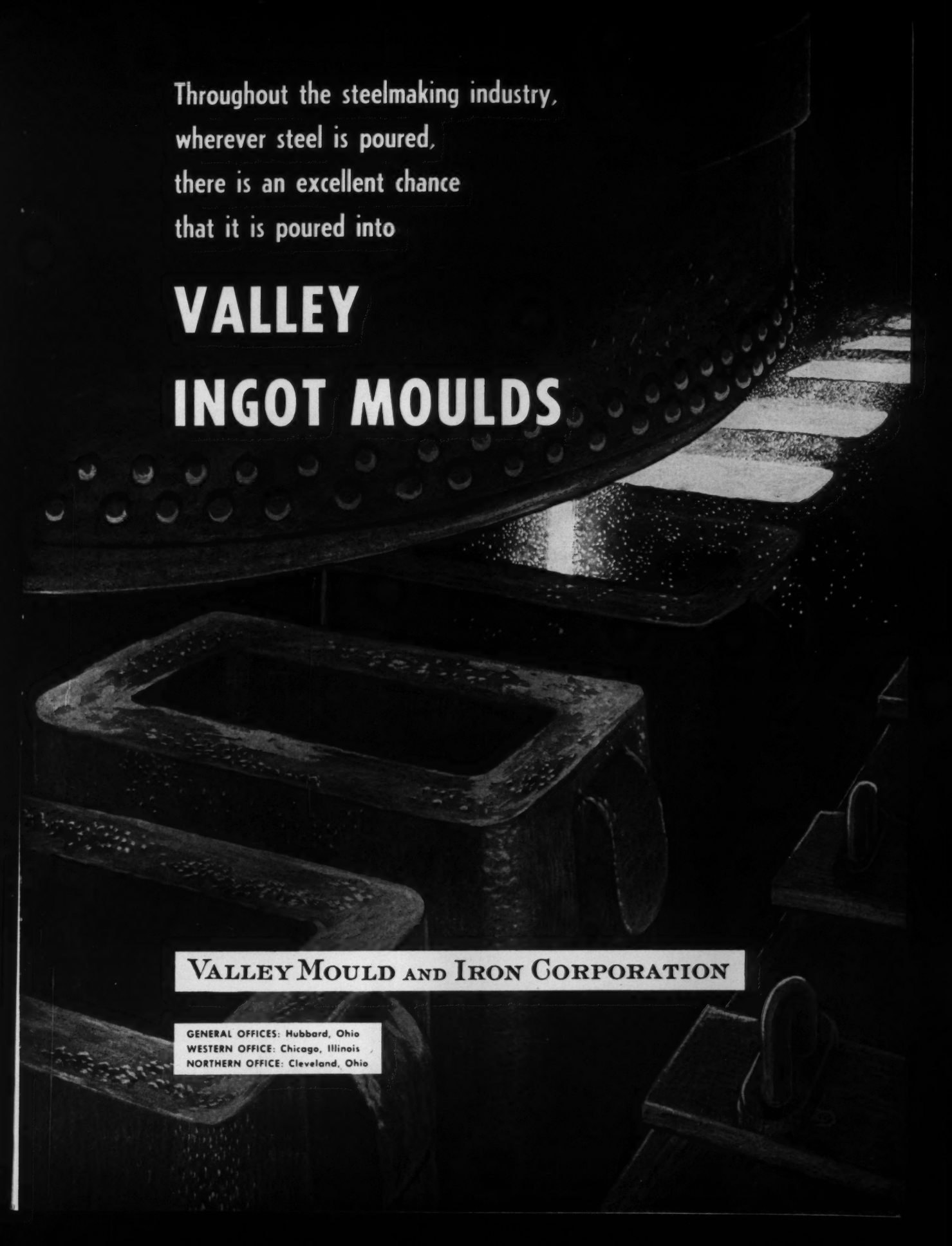
For more data circle No. 73 on postcard, p. 107

Continuity Tester

Used by inspection, quality control, and production departments, a semi-automatic continuity and resistance tester features compact



size and simple operation. Measuring 13⅞-in. wide, 7⅜-in. high, and 9¼-in. long, the tester automatically tests each wire under direct continuity, or check out against all other wires in harness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or unit under test. It also indicates the fault that exists. The standard model can check 64 wires or 128 contacts at a time. (Intercontinental Dynamics Corp.)

For more data circle No. 74 on postcard, p. 107

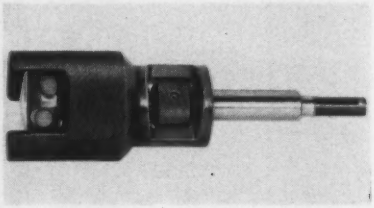
Rapid-Action Vise

With a jaw width of 4⅜ in. and maximum opening of 5⅛ in., a precision rapid-action vise slides into position and is fully tightened in less than a second. The lever is always accessible and needs no shifting when vising. It's a unit designed and manufactured in Sweden. (B. K. Kran Corp.)

For more data circle No. 75 on postcard, p. 107

Hole-Location Gage

With its indicator axially centered and recessed in head, a new model gage is read directly in line with the hole being checked. Reading indicator, when checking holes at bench level, is also facilitated. The ground and lapped pilot member remains stationary in its locating hole, while a knurled thumb

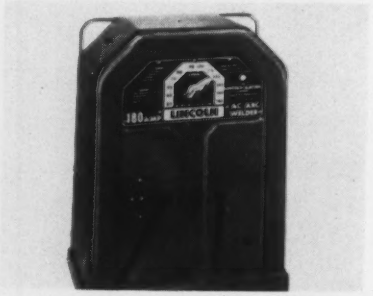


knob is rotated to actuate an indicator finger that checks runout on other hole. This virtually eliminates wear on the pilot. (Mayes Tool Co.)

For more data circle No. 76 on postcard, p. 107

Repair Arc Welder

Placing the convenience of immediate arc-welding repair in every metalworking area, is the purpose of a new design 180-amp welder. Dial-type control provides easy



positive setting of the welder output over a wide amperage range. Electrodes, from the smallest to 3/16-in. size, can be used to weld materials for 20 gage to ½-in. or thicker plate. The unit has stable arc characteristics and will weld mild steel, low-alloy steel and 18-8 type stainless steels. Operation is on 220-v single-phase power supply. Voltage input adjustment insures full output performance under all power-supply conditions. (The Lincoln Electric Co.)

For more data circle No. 77 on postcard, p. 107

Heating Element

A departure from standard silicon-carbide furnace element types, has been introduced for electric furnaces at element temperatures up to 1575°C. The new silicon-carbide heating element is fabricated in one

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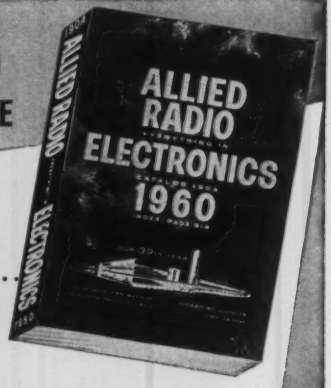

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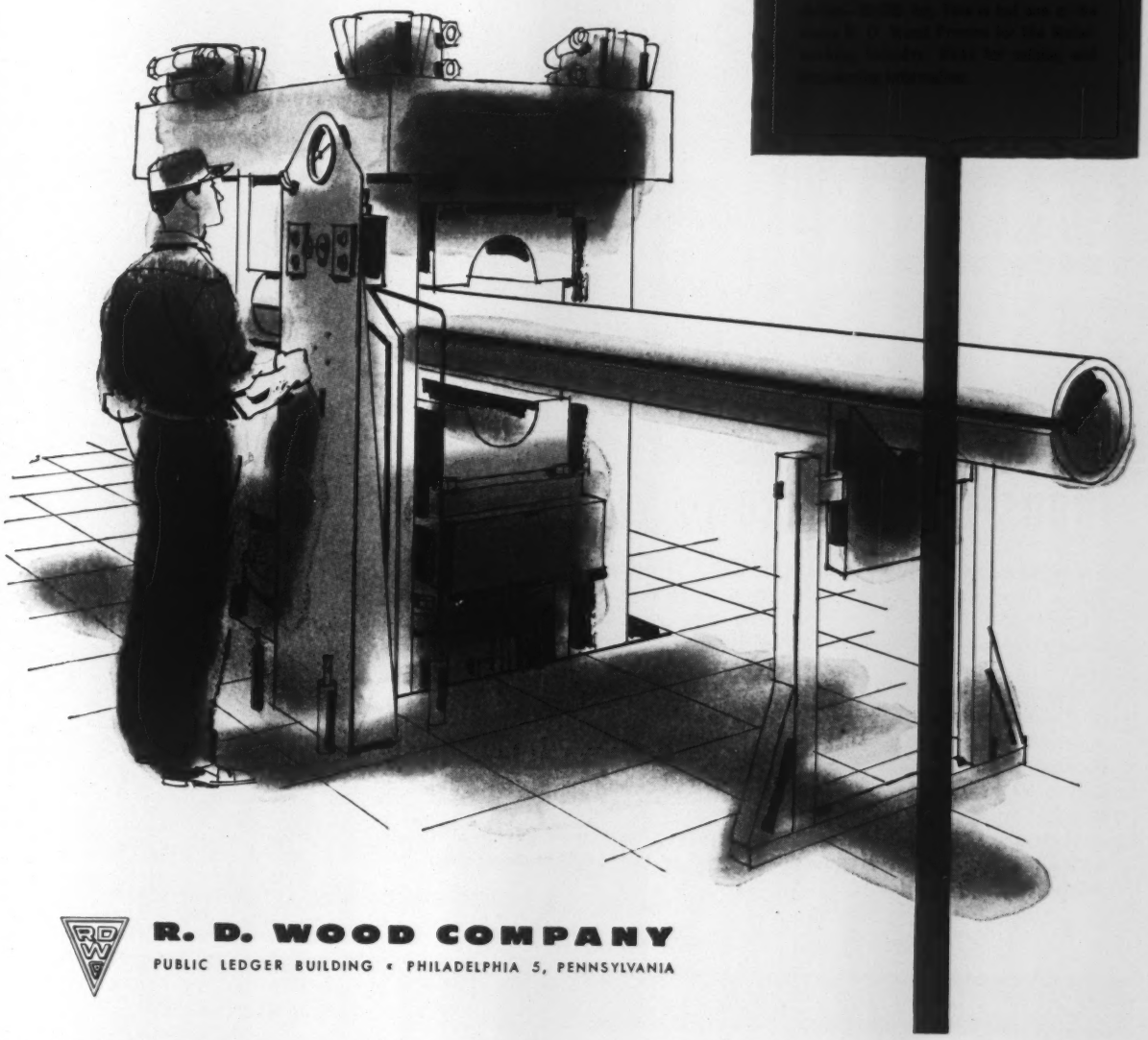


R. D. WOOD COMPANY

PUBLIC LEDGER BUILDING • PHILADELPHIA 5, PENNSYLVANIA

piece with the hot zone in the form of a spiral. It has no joints to fail. (Morganite Inc.)

For more data circle No. 78 on postcard, p. 107

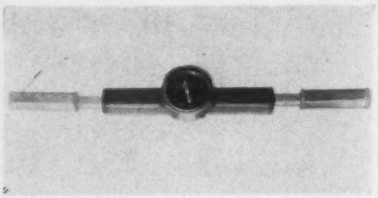
Flow Regulator

With a high degree of accuracy, a regulator controls the flow of any fluids or gases, in field operations. Operating pressure ranges are 0 to 8000 psi and are adjustable from 8 psi to full inlet pressures. Some of its features are: less than 50-millisecond response time, from lockup to full flow, or vice versa, regulates with only 15-psi pressure differential between supply and regulated pressures, and practically no maintenance problem. (Solrac Inc.)

For more data circle No. 79 on postcard, p. 107

Torque Wrench

Excellent for use in confined spaces, a double-handle torque wrench torques both left and right. Less than ¾-in. rotary travel gives a total torque range of 100 in.-lb. The torque bar is made of alloy steel which will retain its setting

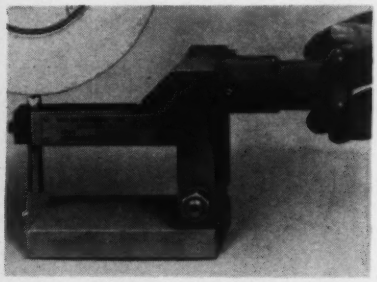


despite rough usage. Dial range is ±0 to 100 ft-lb with minimum graduation equal to 5 ft-lb. (Apco Mossberg Co.)

For more data circle No. 80 on postcard, p. 107

Radius Dresser

Maintaining an accuracy of 0.0002 in., a radius dresser has an enlarged capacity, dresses all abrasive wheels up to and including 12 in. in diam. Removal of the

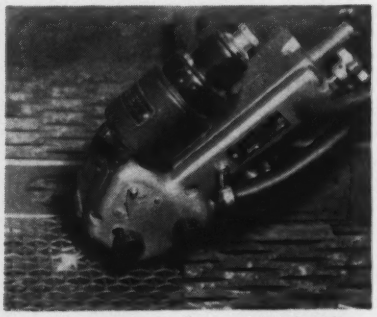


wheel guard is eliminated since the wheel is dressed from below. Four stop pins allow complete adjustment from 90° through 180°. (Somerset Tool Co.)

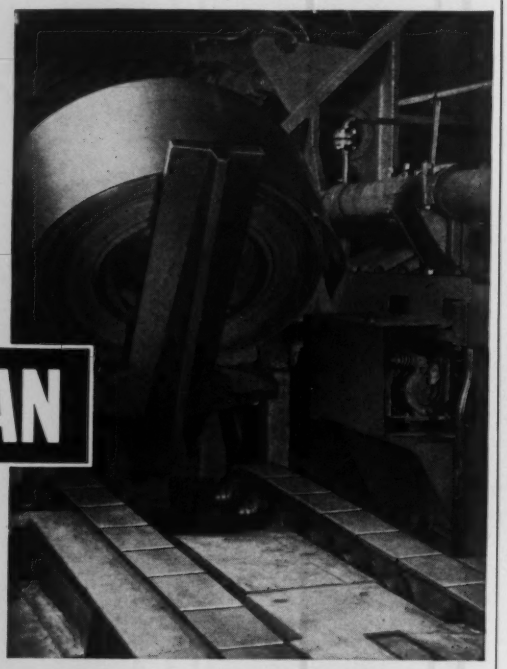
For more data circle No. 81 on postcard, p. 107

Cuts Wire Cloth

Arc torches can quickly cut wire cloth and expanded metal. The resulting cut is clean and smooth.



There's no need for special holding jigs or deburring of the cut edge. Either the manual or automatic



It's LASSMAN for Dependable Industrial Hydraulic Equipment

A coil downender presents some difficult hydraulic control problems. These stem largely from the fact that there is a point in the cycle where the load shifts from a resisting to an overriding one. In addition, high speed of operation with smooth acceleration and deceleration is essential.

The LASSMAN HYDRAULIC SYSTEM for a Coil Downender is simplicity in itself. We eliminate the customary valves for speed control, acceleration, deceleration, pressure relief and counterbalance. Oil cooling is unnecessary in most installations. Performance is further enhanced by virtue of our trunnion type cylinder which permits rigid installation of piping, thereby eliminating hoses.

Such a well designed Hydraulic System is typical of BENJAMIN LASSMAN & SON. It is your guarantee of top performance with minimum maintenance.

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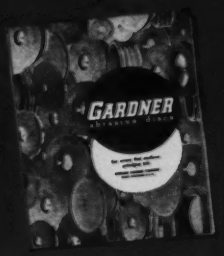
actual competitive test gives user "best wheel life ever"

production facts

Part:.....Exhaust flanges
Machine:
Vertical Spindle Surface Grinder
Abrasive:.....18" x 5" x 10"
Production:
127,000 parts per wheel
Dressing Time:
Only two dressings during entire life

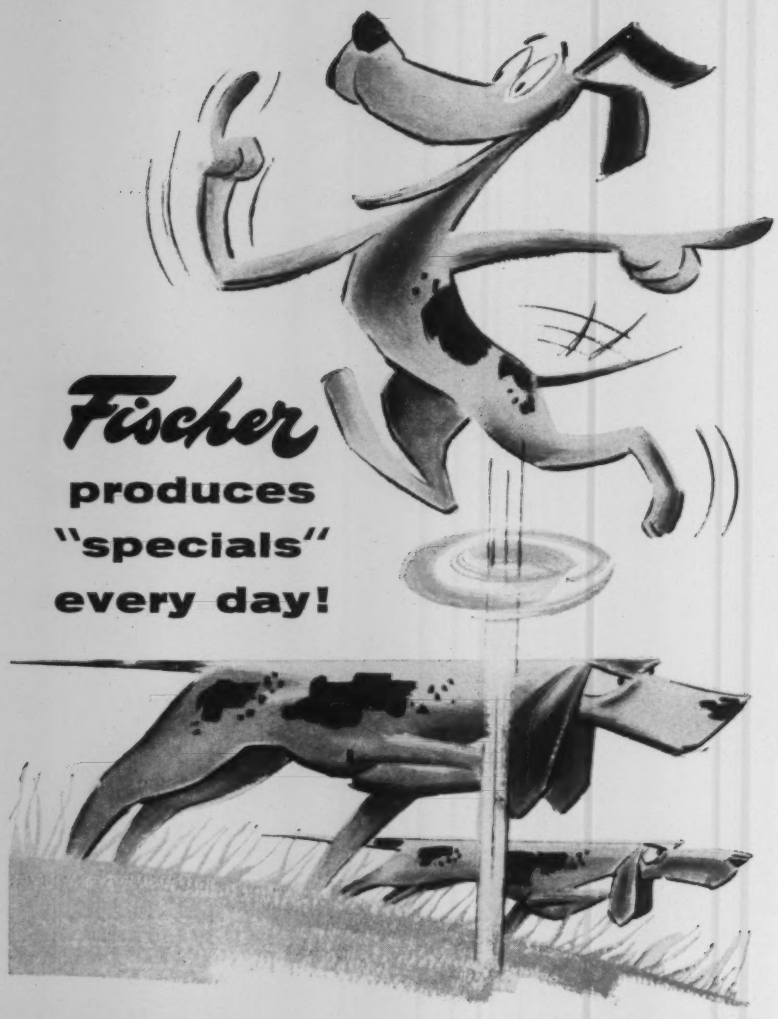
Investigate the profit possibilities of Gardner grinding for your production. Call your Gardner Abrasives Specialist, or write for Abrasive Catalog AC-57.

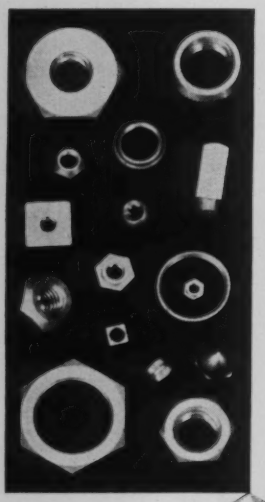


GARDNER

abrasive discs

BELOIT, WISCONSIN





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NEW EQUIPMENT

models of a line of arch torches will cut at speeds of 48 ipm. (Arcair Co.)

For more data circle No. 82 on postcard, p. 107

Temperature Controller

An electronic controller gives highly sensitive temperature control within 1°F, up to 600°F. The stainless-steel sensing element is a very small bullet-probe, 1-in. long and ¼ in. in diam. Using lightgage twisted lead wire, the thermister probe may be placed in platens,

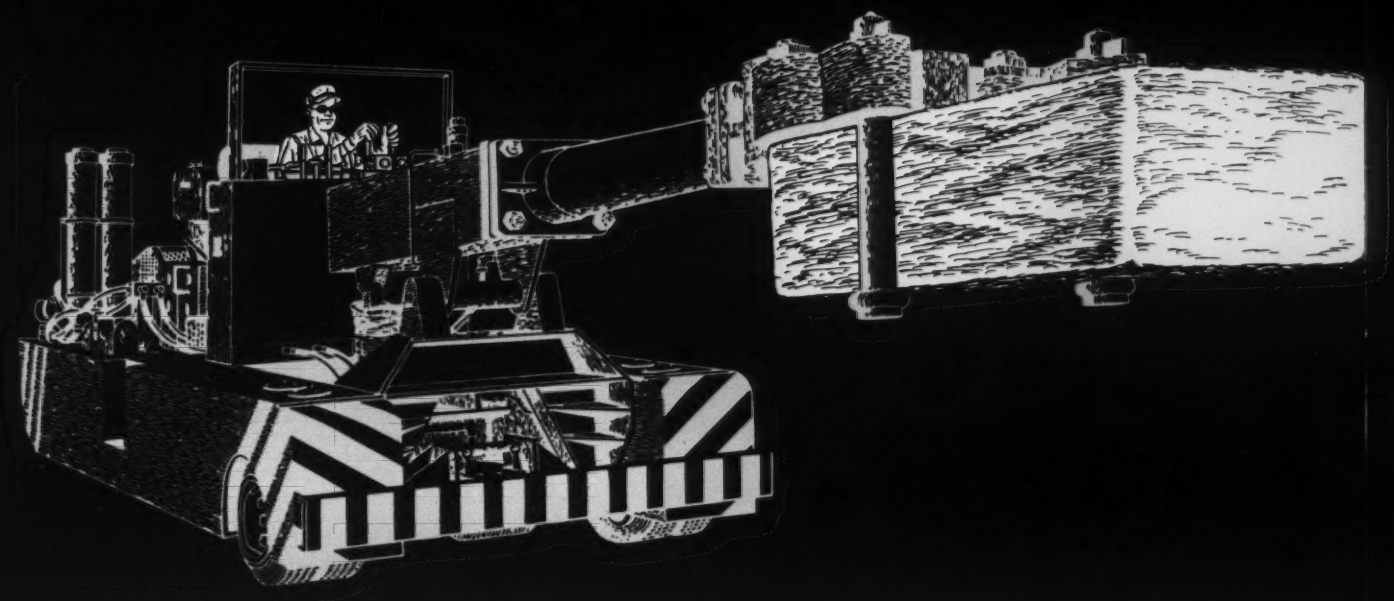
air ducts, and immersion wells up to 100 ft away from the amplifier relay cabinet. The controller can regulate loads up to 10 kw without a separate magnetic contactor. The device may be used on 120, 208, or 240 v, 60 cycles. (Edwin L. Wiegand Co.)

For more data circle No. 83 on postcard, p. 107

Solenoid Valve

Controlling pressures from 1000 to 9000 psi, a poppet-type, two-way valve opens to allow circulation of the hydraulic fluid through it and back to the reservoir. When actuated, the valve blocks the return line and forces the oil through the hose to operate the workpiece. Frictional heat is reduced to a minimum, and the valve is designed to give long trouble-free service. The valve measures 3¼ x 7 x 8½ in., and weighs 8 lb. Available with either a hand or foot switch, it operates on 110-v, 60-cycle current. (Manco Mfg. Co.)

For more data circle No. 84 on postcard, p. 107



You save time, space and money with this Salem-Brosius furnace charging machine

For maximum efficiency and flexibility in furnace operations, load and unload your heating furnaces and charge your melting furnaces with a Salem-Brosius Auto-Floor Charging Machine. One man at the controls operates this agile piece of equipment, serving furnaces faster and with greater all-around economy than is possible with any other stock-handling equipment.

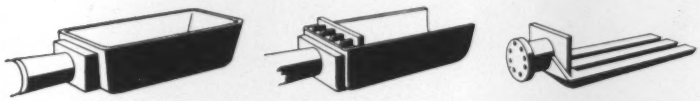
Floor travel is rapid and unencumbered, and stock handling is swift, positive and effortless. It reduces manpower by mechanizing furnace charging.

Self-powered, the machine is built in seven sizes, ranging in load carrying capacities from 2000 to 20,000 lb., and operates at floor speeds up to 250 ft. per min., doing the complete stock-handling job without auxiliary materials handling equipment. It requires no floor installations that become permanent obstructions; nor does it become an obstruction when not in use, because it can be parked out of the way. The Salem-Brosius Charging Machine is highly maneuverable, being able to turn on its own wheelbase to reach furnaces and stock piles anywhere in the plant.

Initial cost of the Salem-Brosius Charging Machine is far less than other types of charging equipment. It has saved as much as 75% in operational costs, replacing several men of a furnace crew. It eliminates costly maintenance of elaborate materials handling equipment, while requiring a minimum of maintenance itself.

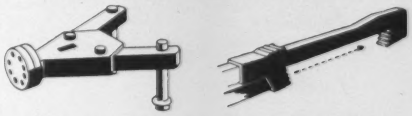
Before you invest in expensive stock-handling equipment, investigate the Salem-Brosius Auto-Floor Charging Machine—designed and built by men who know your stock-handling problems.

MELTING FURNACE WORK HEADS



Rotating Box | Pusher Box | Pusher Fork

HEATING FURNACE WORK HEADS



Tongs | Sliding Jaw

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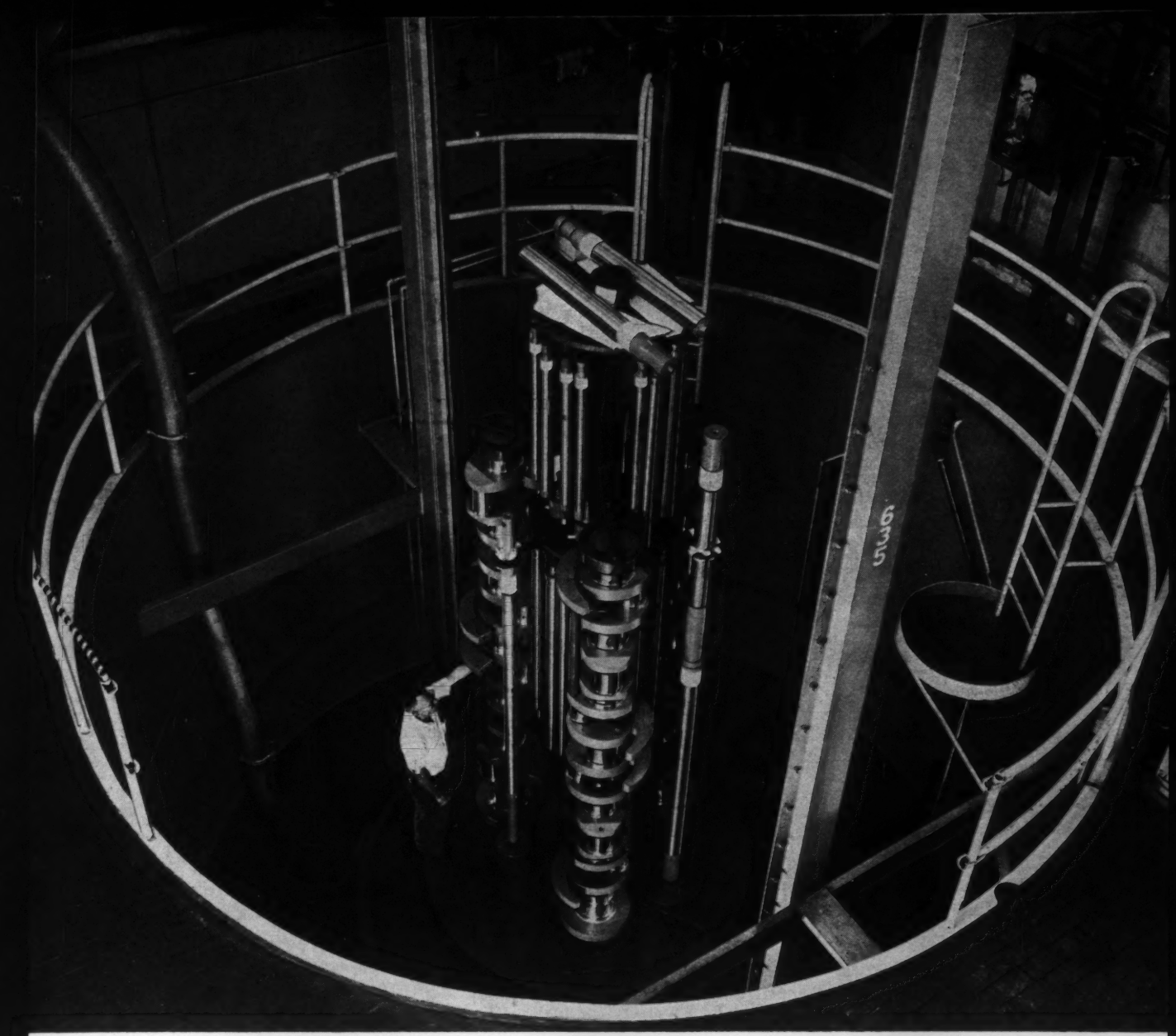

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National Forge does it—with a nitriding installation that is one of the largest and most modern in existence. Now diesel crankshafts, pump eccentrics, compressor pistons and rods, gears, marine couplings, and many other machinery parts are not only *forged* at National, but *nitride-hardened* to add strength and reduce wear. Vertical nitriding furnaces like the one illustrated will accommodate forgings up to 16 feet in length.

National Forge also has its own basic electric melting facilities and produces all the usual types of nitriding steels, including the recently developed 5% nickel, 2% aluminum grade. For further information, write for bulletin NH-1058.

NATIONAL FORGE COMPANY

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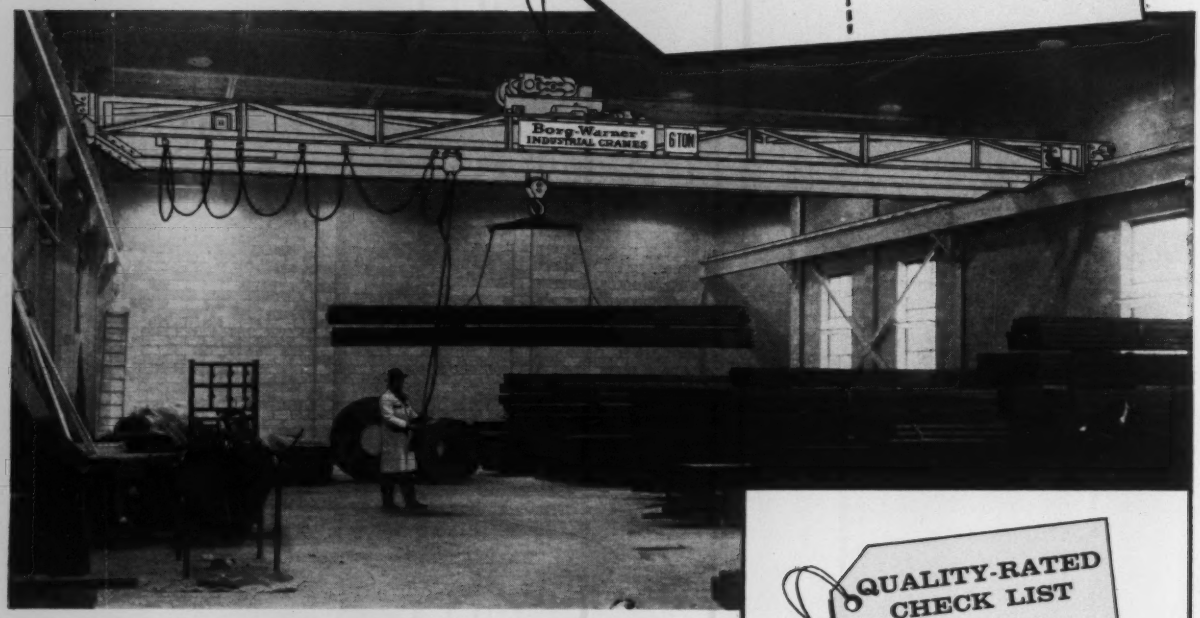

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An efficient, modern crane system may cost far less than you think. Owners of existing crane systems usually overestimate the cost of new equipment.

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QUALITY-RATED CHECK LIST

- Full 6 ton rating with ample reserve capacity.
- Cambered bridge girders.
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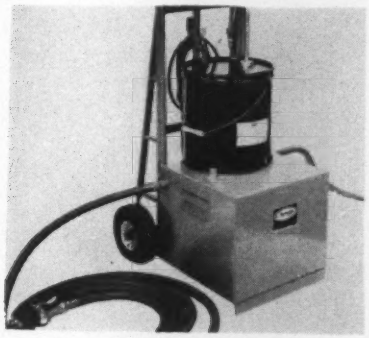
Dust Suppressor

A portable dust-control system can control dust at mullers, shakeouts, mixers, pug mills, truck unloading bins and other dust gathering points. The unit is designed for single-point dust suppression or controlled wetting of raw materials. Four different models of the basic

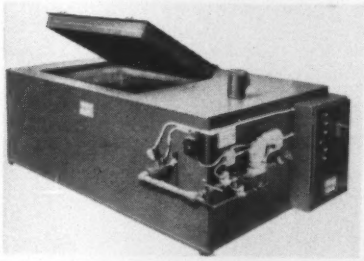


systems are available. Each of the systems includes a proportioner, mixing chamber and auxiliary controls mounted on a hand truck. The four designs, two manual and two automatic, cover both local or remote operation and span the entire range of operation. (The Johnson-March Corp.)

For more data circle No. 85 on postcard, p. 107

Top-Loading Oven

A new top-loading oven has continuous working temperatures up to 950°F. The heavy-duty floor grill is designed for 5000-lb load. Working space is 3½ ft wide x 5 ft long x 1½ ft deep. Features in-



clude high air recirculating rate, automatic temperature controls and electronic combustion safeguards. It's available in gas-fired or electrically - heated models. (Young Brothers Co.)

For more data circle No. 86 on postcard, p. 107

Most Important Event in METALWORKING

1960 ASTE TOOL SHOW and CONFERENCE

530 exhibitors will be on hand to show and demonstrate more than 6,000 products . . . machine tools and attachments, precision control and inspection equipment, automation devices, cutting tools, dies, jigs and fixtures . . . everything, in fact, that's *new* in tools and tooling. It's your best opportunity to see, study, compare . . . under one roof, at one time . . . the most modern, scientific methods, processes and tools in metalworking.

Equally important, the Tool Engineering Conference, with its 36 technical sessions, 70 outstanding papers, offers you an opportunity to learn about and discuss the latest technical advances and developments in the science of tool engineering.

There'll be plant tours, too . . . a chance to see and study, in actual operation, product and process methods in the world's major center of high-volume production.

All of these scientific and educational attractions, and more, will bring more than 35,000 metalworking management, engineering and production men to the 1960 ASTE TOOL SHOW. Make sure you're one of them! Write or wire immediately for your rapid registration forms.

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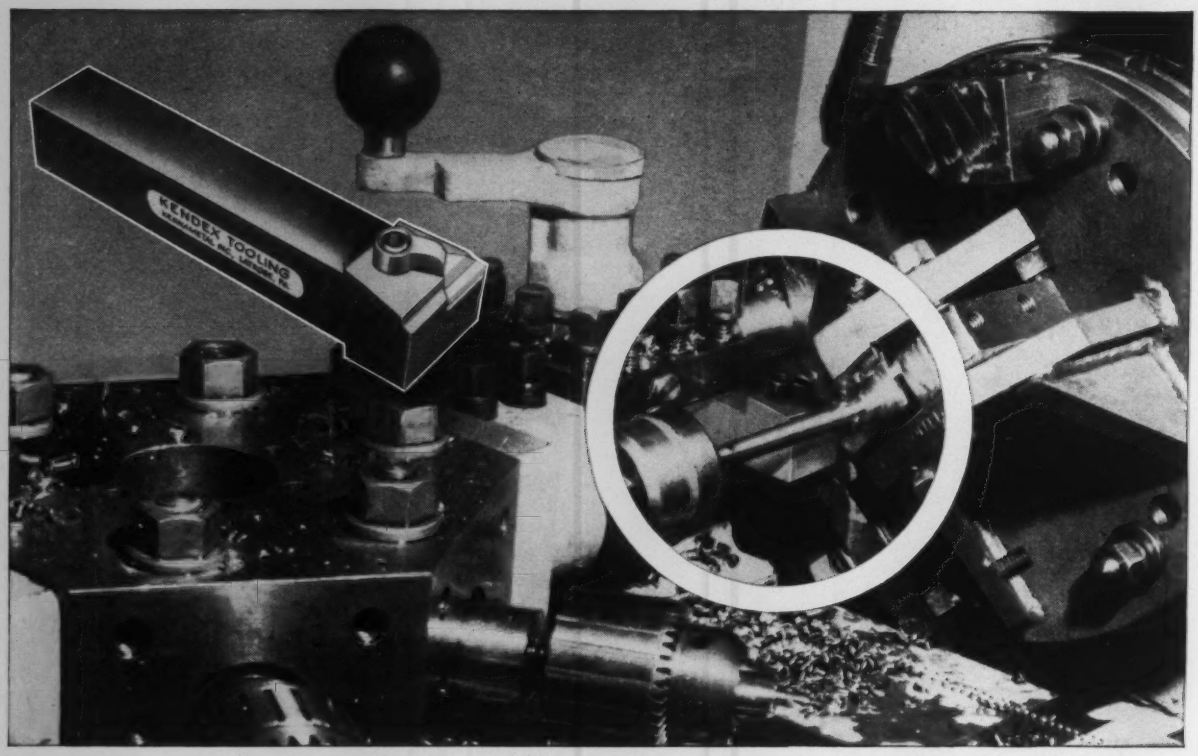

Support bracket for Nike-Hercules guided missile, being machined with Kendex* (patented) tooling from a 316 stainless forging. Photo and performance data supplied by a leading aircraft manufacturer.

If you could cut machining cost/piece 78% wouldn't you switch to KENDEX?

That's what happened here

Two turret lathes with high speed steel tools operating on a 10-hour shift could not meet the demands of an assembly line in an aircraft plant. The job involved turning a ½-inch stud and an interrupted facing cut on a forged stainless steel part.

When one lathe was equipped with Kendex (patented) tooling and Kennametal* K8 inserts to utilize maximum output capability of the machine, production was increased fivefold and enough parts were produced by this one machine in 8 hours to keep the line running. The second lathe was released for other work.

While tooling cost per hour increased over 500%, the machining cost per piece dropped from $3.08 to 68 cents. By sacrificing a few pennies in higher tool costs, many dollars are being saved in over-all machining costs.

Progressive plants everywhere are using Kendex throw-away insert tooling on production operations and many short-run jobs to obtain highest possible machine efficiency. They have found that "baby-ing" tools to get long tool life is a costly practice.

Ask your Kennametal Carbide Engineer how Kendex can help you get more efficient output from *your* machines . . . or write direct for the booklet, "There's Profit in Retiring a Tradition." KENNAMETAL INC., Latrobe, Pennsylvania.

*Trademark

97285

Don't waste dollars in machine output to save pennies in tool life

	640-minute tool life	125-minute tool life
Machine cost per hour	$ 6.00	$ 6.00
Tool cost per hour	.16	.86
Combined cost—8 hours	$49.28	$54.88
Pieces produced—8 hours	16	80
COST PER PIECE	$ 3.08	$ .68

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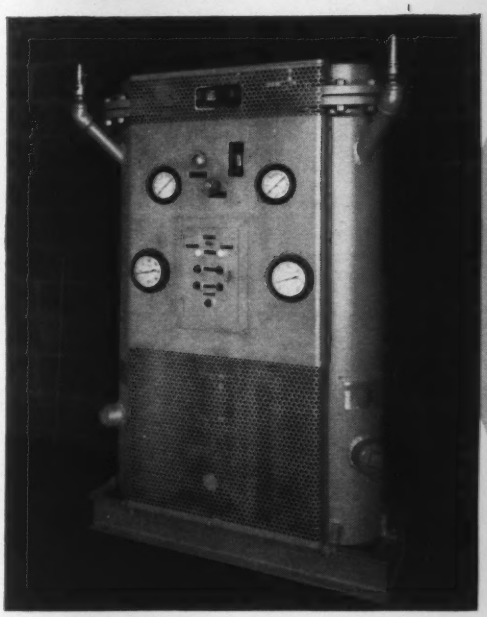
give you 3 big advantages!

- In drying compressed air for air tools
- Drying hydrogen, helium, nitrogen
- Purifying furnace gases
- Drying instrument air
- Metal treating and brazing
- Drying air for paint sprays
- Testing equipment



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Thermostatic control conserves heat input . . . keeps ideal temperatures for the highest operating efficiency at the lowest operating costs. The entire network is protected by an alarm circuit.

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Once the program timer is set, everything is regulated automatically. Drying takes place with the least loss in pressure, the lowest cost in maintenance and operation. For further information, write for Bulletin D-103 . . . or call the man from Kemp listed in the Chemical Engineering Catalog.

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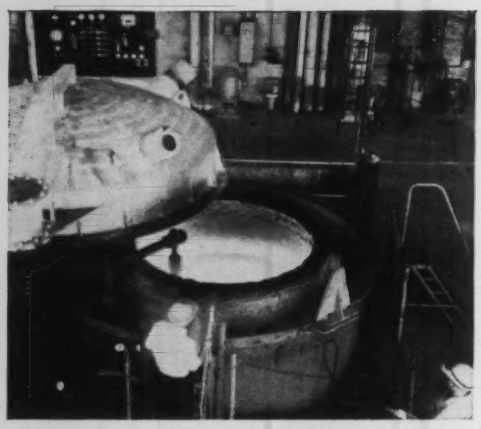
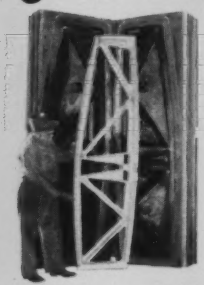
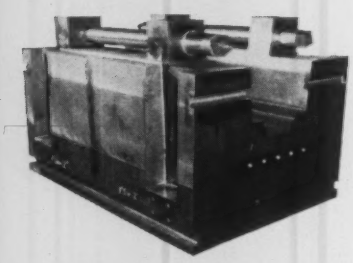


FINKL *Vacuum Degassed* DIE BLOCKS and FORGINGS *give longer service life!*



Two 15,800 pound Finkl dies for precision aircraft forgings



36,000 pound die holder for use in titanium production, completely machined by Finkl

DIE BLOCKS made with Finkl vacuum degassed EF steels have greater ductility and toughness. This means that the chances of breakage under severe operating conditions is reduced. More production time is made available. With about 50% of the non-metallic inclusions removed from the steel, machineability is improved. Fewer tool regrinds are necessary. Higher lusters are obtainable in the impressions.

We supply 5 types of pre-hardened, ready-to-use die blocks, inserts and hot work tools in Special Machining Quality steel.

FORGINGS by Finkl are famous for their strength and resistance to withstand the severe stresses and strains imposed by modern heavy-duty machinery. Now available on request are Finkl vacuum degassed EF alloy steel forgings. The degassed steel adds even greater toughness and ductility to the forging, and the cleaner steel substantially increases tool life.

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FORGE REPAIR PARTS with the advantages of Finkl vacuum degassed EF alloy steels are also available on request.

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NEW FILMS

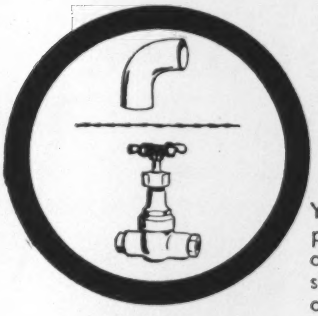
"Numerical Control Manufacturing" shows the advantages and cost savings resulting from the use of numerically-controlled machine tools and how they're used in typical installations. Reported by news analyst Chet Huntley, the film features numerically-controlled machine tools in actual operation. Typical operations include the machining of intricate shapes such as cams, dies, turbine blades and structural parts. 22 minutes. 16-mm color, sound. Industrial Controls Section, Bendix Aviation Corp., 21820 Wyoming Ave., Detroit 37.

"Building With Prestressed Concrete" illustrates how prestressed concrete strands in concrete building materials increase strength and rigidity. Many other advantages of prestressed concrete are shown 20 minutes. 16-mm color, sound. Colorado Fuel and Iron Corp., P. O. Box 1920, Denver.

"Education Is Everybody's Business" shows the dramatic changes, since the turn of the century, in America's economic and social life. The film emphasizes the important role of higher education in providing essential training, research and specialized services. Critical national and educational requirements of the next decade are projected. Various measures for obtaining public and private support are suggested. 17 minutes. 16-mm color, sound. Council for Financial Aid to Education, Inc. 6 East 45th St. New York 17.

"Dimensional Gaging With Air" features actual tests which illustrate basic principles of air gaging. Demonstrations show practical applications and possibilities. Other scenes show how air gages are used in general machine shop gaging; how they're applied to high-production multiple inspection; and how they meet various types of machine-control needs. 42 minutes. 16-mm color, sound. Federal Products Corp., 1144 Eddy St., Providence.

Stainless pipe and fittings



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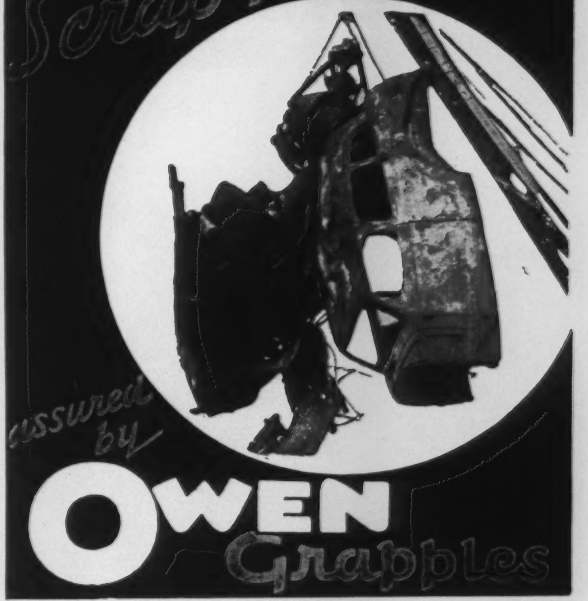

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**Machine tools to be shown at European Machine Tool Show, Hanover, September 11-20, 1960*

News about the nation's leading steel plate specialist

Helping solve customers' problems is the job of Lukens' Technical Service Department. Here are four members: (left to right) Lou Keay, Metallurgist and Department Manager; Les Dawson and Harry McClure, Welding Engineers; Dick Rote, Metallurgist.

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The Iron Age Summary

Secondary Buying Wave Hits

Smaller users are moving in to accept tonnages cancelled or deferred by automakers.

The change to a buyer's market is about accomplished, but demand stays strong for most products.

■ A secondary wave of demand is bringing a minor tide of new business into steel sales offices. The effect is a bolstering of the market which only two weeks ago looked much more shaky.

The new orders are generally from small users who have stepped forward to fill in most space left by cancellations and deferments.

Cutbacks Minimized—This does not change the overall market significantly. But it does stabilize it by minimizing the effects of current cutbacks — principally by automakers.

With the new order volume up slightly, attention focuses on the complex relationship of steel shipments, orders, and consumption.

New orders are still below shipments, which remain at capacity. But consumption by users is apparently well ahead of new order volume. This means a continued inventory building, but at a slow rate.

Slow Buildup — At the same time, most steel users are working on a good rate of orders for their own products. This means a high rate of production at least through April and well into May. At the same time, there is less chance of a major inventory buildup in the first half of this year.

The new surge of orders points out a factor that many overlooked, probably because of over-emphasis on the plans of the automakers. This is the simple fact that since the steel strike many fairly large steel users had not been able to get all the tonnage they wanted. Furthermore, their inventories were, and are, out of balance. Now, they are using the new opportunity to remedy that situation.

Eyes on Auto Sales—The auto steel market is still the critical factor. Deep gloom is premature and it may be April before this market can be assessed thoroughly.

But Detroit sources warn that the auto production rate of 150,000 to 160,000 per week may drop off to 110,000 to 120,000 late this month. Certainly auto steel buyers are not committing themselves.

Forces at Work—This is the general trend followed by other major steel users. Customers are not interested in placing May and June orders. April tonnage has come in late, but full to nearly full operations are assured for most mills and products during that time.

Two contradictory facts now characterize the market. First is the change from a seller's market to a buyer's market. Although orders are high and operations still at a near record, the buyer is in control.

Second is the fact that many companies still need steel, both for inventory buildup and to fill holes in specific products. This is the cause of the secondary wave of buying.

Prices At a Glance

(Cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.41	$66.41	$66.41	$66.41
Scrap No. 1 hvy (Gross ton)	$34.50	$37.17	$42.17	$41.83
No. 2 bundles	$21.83	$23.50	$28.17	$30.00
Nonferrous				
Aluminum ingot	28.10	28.10	28.10	26.80
Copper, electrolytic	33.00	33.00	33.00	30.00
Lead, St. Louis	11.80	11.80	11.80	10.80
Magnesium	36.00	36.00	36.00	36.00
Nickel, electrolytic	74.00	74.00	74.00	74.00
Tin, Straits, N. Y.	100.00	102.25	100.50	104.25
Zinc, E. St. Louis	13.00	13.00	13.00	11.00

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	2,654	2,690	2,693	2,556
Ingot Index				
(1947-1949=100)	165.2	167.5	167.5	159.1
Operating Rates				
Chicago	98.0	93.0*	96.0	93.0
Pittsburgh	96.5	96.5*	97.0	92.5
Philadelphia	93.0	94.5*	100.0	94.0
Valley	86.0	87.0*	90.5	96.0
West	87.0	90.0*	88.0	86.0
Cleveland	100.0	102.0*	100.0	91.0
Detroit	99.0	99.0*	79.0	99.0
Buffalo	105.0	105.0	105.0	102.0
South Ohio River	104.0	102.0*	103.0	95.0
South	81.0	83.0	92.0	81.0
Upper Ohio River	94.5	95.0*	93.0	95.0
St. Louis	96.0	103.0*	92.0	90.0
Aggregate	93.1	94.4	94.5	90.3

*Revised

Practical Trend in the Office

New office furniture and equipment puts more emphasis on its practical values.

But there is little or no sacrifice of good design, or flexibility.

■ The pendulum is swinging back toward the practical in office furniture.

But there is apparently no sacrifice of the progress in design made in the last few years. And the flexibility of the modular concept is still a major factor.

One example: Standard Pressed Steel Co., Jenkintown, Pa., has come up with a line of desks it calls Ampla. The company says that by doing away with the standard center drawer and redesigning, six desks can fit in space which would formerly accommodate only five.

Many Combinations — Ampla comes in both standard and custom colors, adding up to over 100 possible combinations. And it is available in 10 packaged models, with 35 different variations possible to suit specific work requirements.

Sharp competition is one of the major factors that allows the practical swing to coordinate with the modular concept and the established trend toward better design.

New Competition—Makers say that the expanding market hasn't dulled the competitive edge. Even adding to it, used furniture dealers are starting to do some restyling along with their refinishing. They are becoming a bigger factor in the market, particularly for prestige furniture, an area where they've never been active before.

Also, the expanding market has attracted new interest from makers of materials. For instance, the industrial design dept. of Kaiser Aluminum & Chemical Co. has designed 12 ultra-modern pieces of executive office furniture in an attempt to prompt more use of aluminum.

New Designs — Their sketches, which have been fairly well received, incorporate such features as sweeping 90° curves, cantilevers, and split area desk tops.

Frank Hershey, Kaiser's industrial design chief, gives a hint of what's ahead in office furniture in his explanation of the Kaiser designs.

Quiet Revolution—"Our designs were planned around the quiet revolution which is taking place in executive office furnishings, where the trend is toward dignified informality. The day of the austere man behind a massive desk is giving way to an unrestrained atmosphere in which the executive meets his caller on a common level around a congenial furniture grouping."

Dealers have felt the sharp edge of competition and are responding as strongly as the office furniture makers. Their strong selling point is service.

Nowadays, there is little need to consult a designer or decorator, even in planning the biggest, most ornate office. Almost all dealers have designers and planners on their staffs. In fact many of the consultants you could have hired a few years ago are now working for office furniture dealers or makers.

OFFICE EQUIPMENT: Office furniture makers are emphasizing the practical advantages their new lines offer. But they still feature wide lines of color, shapes, materials and modular flexibility.

NORTHERN Cranes for production

Repeated selection of Northern Overhead Electric Traveling Cranes in high production plants is evidence of their dependability in providing long-term, low-cost, heavy duty service—fast, accurate operating control—minimum downtime for maintenance—maximum safety—and three-shift service seven days per week when required. For additional information call your nearby Northern representative, or write or call Northern's main office.

These four Northern Cranes, each of 25-ton capacity (with 10-ton auxiliary hooks) and 116-foot span, are operating in a large, integrated automotive press plant. Each crane has 8-wheel compensating end trucks, full length footwalks on both girders, and rotating steel handling equipment.

MATERIAL HANDLING EQUIPMENT BY NORTHERN

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Small Steel Users Buoy Market

The steel market isn't going to soften all at once. This was feared a few weeks ago.

Small steel users are showing they need more steel. And their orders are filling the gaps left by cancellations from big users.

▪ Cancellations and stretchout orders from automakers and others may not cause as sharp a drop in steelmaking operations as was feared only a few weeks ago.

While the big steel users have been satisfied with the supply situation, the smaller users have not. Until now, many could only get what steel the mills were willing to offer them. This generally hasn't been enough to maintain high production and also rebuild inventories.

But the holes opened by cancellations from large users are giving them a chance to fill their needs. And they're making the best of the opportunity. Their orders are just about filling the holes.

The net effect will be to keep mill operations at a high level for a while longer. And mill operations will ease downward, rather than fall off more abruptly.

Sheet and Strip—Another round of cutback and stretchout orders from the auto industry is causing some guessing among steelmakers. April bookings are strong in the **Midwest.** But steel salesmen are growing apprehensive.

The action by the automakers apparently hit this area the hardest. And steel industry representatives note that this has put fresh tonnages on the market for short delivery. They believe this could weaken steel buyers' interest in long-range booking. And they aren't sure whether it will cause other large users — auto suppliers, appliance makers, and warehouses — to cut their orders, too.

There's less pessimism noticed in **Pittsburgh,** compared with a few weeks ago. Smaller users have come into the market to fill the holes caused by cancellations for late March and April tonnages of flat-rolled products. Demands from large users had kept them from getting anything more than nominal quotas from the mills.

Now, the needs of the small users are filling the holes nicely. While overall demand has definitely eased, the secondary demand showing up will prevent the sharp drop that was feared only a few weeks ago. and **Cleveland** has yet to notice any weakening in demand for sheet and strip. Carryovers from March assure a full April schedule for district mills. And schedules are fairly well filled through the first half of the year. Some mills are still running nearly a month late on deliveries of some products.

PURCHASING AGENT'S CHECKLIST

Price increase for Venezuelan iron ore will be absorbed by suppliers, not passed on to consumers. P. 58

Should flow of purchased materials be centralized in a single purchasing authority? P. 64

How to get more from your cutting fluids dollar. P. 87

Bars—The demand for bars, particularly cold - finished, remains strong. But there are signs that the extreme tightness of the market is easing. In the **Cleveland** area, rolling schedules are fairly well filled to mid-year due to a strong demand from automakers and their forging suppliers.

Producers expect some overbooking for May and June in anticipation of cancellations and stretchouts coming through about then. But small diameter, cold-finished bars are getting easier to find in **Detroit.** A few weeks ago this was one of the tightest items. Mills are running at capacity in the **Midwest** and are booked solid for several weeks. But cold finishers are offering April delivery without getting a strong response. They expect the remaining pressure for quick delivery to ease in the next few weeks.

Stainless—April should tell the story for stainless. By then, post-strike momentum will have spent itself. Producers around **Pittsburgh** are eating into backlogs now and should be selling on a fairly current basis by April. No one knows for sure where the return to normalcy will leave the mills.

With short lead times, the mills won't have the full picture until they are actually into the month. However, one leading producer is optimistic. While customers are revising inflated estimates downward, there is still a strong, solid base of consumption. And the industry predicts stainless shipments in 1960 will top those of 1959.

Pipe—Despite a backlog of orders for large diameter pipe, a mill in the **South** may be forced to shut down. Customers can't get the necessary Federal Power Commission certificates for their projects. So, they don't order the pipe. The award of certificates involves lengthy hearings, principally to establish rates. And FPC has a backlog of projects to hear. Linepipe is in fair demand and production is at fair levels. A large part of all tonnage is going into field inventories for an expected spring spurt. The same is true for merchant pipe.

COMPARISON OF PRICES

(Effective March 1, 1960)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	Mar. 1 1960	Feb. 23 1960	Feb. 2 1960	Mar. 3 1959
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.00	14.00**	14.00**	13.55
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchants bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	45.00
Wrought iron bars	14.90	14.90	14.90	14.90
Wires: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 100 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	Mar. 1 1960	Feb. 23 1960	Feb. 2 1960	Mar. 3 1959
Pig Iron (per gross ton)				
Foundry, del'd Phila.	$70.57	$70.57	$70.57	$70.57
Foundry, Southern Cin'ti	73.87	73.87	73.87	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.07	70.07	70.07	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese, 74-76 pct Mn, cents per lb‡	11.00	11.00	11.00	12.25
Pig Iron Composite: (per gross ton)				
Pig iron	$66.41	$66.41	$66.41	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$36.50*	$38.50	$44.50	$45.50
No. 1 steel, Phila. area	35.50*	37.50	41.50	38.50
No. 1 steel, Chicago	31.50*	35.50	40.50	41.50
No. 1 bundles, Detroit	32.50*	34.50	41.50	38.50
Low phos., Youngstown	40.50*	43.50	48.50	48.50
No. 1 mach'y cast, Pittsburgh	53.50*	55.50	55.50	51.50
No. 1 mach'y cast, Phila.	51.50*	52.50	54.50	49.50
No. 1 mach'y cast, Chicago	53.50*	56.50	61.50	56.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$34.50*	$37.17	$42.17	$41.83
No. 2 bundles	21.83*	23.50	28.17	30.00
Coke: Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	$14.75-15.50	$14.75-15.50	$14.50-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	33.00	33.00	33.00	30.00
Copper, Lake, Conn.	33.00	33.00	33.00	30.00
Tin, Straits, N. Y.	100.00*	102.25	100.50	104.25
Zinc, East St. Louis	13.00	13.00	13.00	11.00
Lead, St. Louis	11.80	11.80	11.80	10.80
Aluminum, virgin ingot	28.10	28.10	28.10	26.80
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡Average. ** Revised.

Finished Steel Composite
Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite
Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composites
Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

INDEX TO PRICE PAGES

Prices At a Glance 147
Comparison of Prices 151
Bars 160
Billets, Blooms and Slabs 158
Boiler Tubes 162
Bolts, Nuts, Rivets, Screws 163
Clad Steel 162
Coke 162
Electrical Sheets 162
Electrodes 162
Electroplating Supplies 163
Ferroalloys 165
Iron Ore 162
Merchant Wire Products 162
Metal Powders 163
Nonferrous
- Mill Products 157
- Primary Prices 151-156-157
- Remelted Metals 157
- Scrap 157

Piling 158
Pig Iron 164
Pipe and Tubing 161
Plates 160
Rails 162
Refractories 162
Service Center Prices 163
Shapes 158
Sheets 159
Spring Steel 164
Stainless 162
Steel Scrap 154
Strip 158
Structurals 158
Tinplate 159
Tool Steel 162
Track Supplies 162
Water Pipe Index 163
Wire 160
Wire Rod 159

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Mills Enter Market At Lower Prices

Lower prices finally brought some mill buyers into the market this week.

But scrap is still not moving and dealers remain discouraged about the future.

▪ Mill pressure for lower prices broke down dealer resistance this week.

Mill offers to buy at prices below market levels quickly brought out scrap. But, as in recent weeks, the buying was limited. In some markets scrap went begging with dealers unable to move even small lots.

Distress Sales — Some dealers feel the market may be reaching bottom—or getting close to it. But the lower prices are not encouraging dealers. Some sales are being made just to unload tonnage. There's not much hope sales will improve in the next few months.

The depressed condition of the market is indicated by the lower prices for last week's industrial lists. Some tonnage went for as much as $9 a ton under February prices.

Export orders are scarce at the moment. But there's some hope more tonnage will move out later this month and next.

Pittsburgh — Prices continue to drop. But the new levels have finally brought mills into the market. Three mill purchases in 10 days time may indicate the market has reached bottom—or close to it. Whether or not this activity will stabilize the market is not yet known. But mills seem to feel they won't be able to buy much cheaper by waiting. Prices of industrial lists last week showed how fast the market has fallen. Local factory bundles went for about $9 under last month's averages.

Chicago — The market broke sharply downward in all grades. Mill offers $2 to $4 a ton under existing prices brought out material almost immediately. Belief the market is hitting bottom was wiped out by the new price drops. Factory bundles sales at $34.75 on-track—delivered at about $38 a ton — were quickly followed by $37 mill purchases. Electric furnace grades shared in the general decline with prices down $3 a ton.

Philadelphia — Prices keep declining in a depressed market. Mills are only nibbling at the market for limited purchases. Export activity has fallen off. Some export cargoes may be filled later this month. Prices for steelmaking grades have dropped $4 to $5 in the last two weeks. Cast grades are showing the most strength in the market. Sales to out-of-the-area buyers are helping support prices on these grades.

New York—Some sources feel the market has hit bottom. There's little activity this week, but dealers look for export demand to pick up in a week or so. The lack of interest dropped blast furnace grades by $2 to $3 a ton.

Detroit — March industrial lists closed with prices reported at $7 to $9 a ton below February lists. Some auto plants offered more tonnage than last month, others less. Overall tonnage will probably be 3 to 10 pct below February levels because of reduced auto production schedules.

Cleveland—With dealers unable to find a market for small lots of their best grades, the market slipped off another $3 a ton. Distress offerings by dealers are increasing. No major orders are in sight. Turnings sales are drying up.

St. Louis—Market remains in a depressed state. Demand is very light. Offers from outside the district and dealer anxiety to sell have pushed prices down. Some sales are being made just to unload some of the heavy supplies.

Cincinnati — Prices declined $3.50 on prime grades on an appraisal basis. Dealers are starting to back away from the new prices. The shutdown on an area blast furnace may help firm up sales.

Birmingham — Consumers are generally staying out of the market. Dealer quotations have dropped $2 to $4 a ton lower, mainly in sympathy with the market elsewhere. Dealers are reaching the point where they won't accept further cuts. Buyers indicate they may be interested in March purchases.

Buffalo—The market continues weak. Prices dropped another $2 a ton. Sales are expected later this week, but the price level is a question. No. 1 heavy melting is now quoted at $32 to $33 a ton.

Boston — Trading is still at a standstill. There are no signs of coming activity. Export has dried up for the moment. Prices continue moving lower, with steelmaking grades off $1 a ton.

West Coast — The market remains on dead center. Dealers are grasping for some hope from current Japanese negotiations for the next quarter's business.

Houston—Market is quiet. District mill is not buying after taking limited tonnages earlier. Foundry buying is also limited and cast prices declined.

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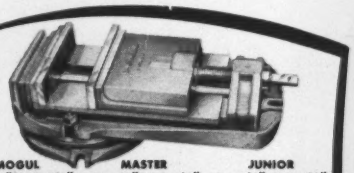

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SCRAP PRICES

(Effective March 1, 1960)

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$36.00 to $37.00
No. 2 hvy. melting	30.00 to 31.00
No. 1 dealer bundles	38.00 to 39.00
No. 1 factory bundles	44.00 to 45.00
No. 2 bundles	25.00 to 26.00
No. 1 busheling	36.00 to 37.00
Machine shop turn.	20.00 to 21.00
Shoveling turnings	25.00 to 26.00
Cast iron borings	24.00 to 25.00
Low phos. punch'gs plate	45.00 to 46.00
Heavy turnings	31.00 to 32.00
No. 1 RR hvy. melting	42.00 to 43.00
Scrap rails, random lgth.	55.00 to 56.00
Rails 2 ft and under	61.00 to 62.00
RR specialities	53.00 to 54.00
No. 1 machinery cast.	53.00 to 54.00
Cupola cast.	48.00 to 49.00
Heavy breakable cast.	46.00 to 47.00
Stainless	
18-8 bundles and solids	230.00 to 235.00
18-8 turnings	115.00 to 120.00
430 bundles and solids	125.00 to 130.00
410 turnings	60.00 to 65.00

Chicago

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	28.00 to 29.00
No. 1 dealer bundles	31.00 to 32.00
No. 1 factory bundles	36.00 to 37.00
No. 2 bundles	17.00 to 18.00
No. 1 busheling	31.00 to 32.00
Machine shop turn.	15.00 to 16.00
Mixed bor. and turn.	17.00 to 18.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Low phos. forge crops	47.00 to 48.00
Low phos. punch'gs plate, ¼ in. and heavier	43.00 to 44.00
Low phos. 2 ft and under	41.00 to 42.00
No. 1 RR hvy. melting	34.00 to 35.00
Scrap rails, random lgth.	46.00 to 47.00
Rerolling rails	55.00 to 56.00
Rails 2 ft and under	54.00 to 55.00
Angles and splice bars	45.00 to 46.00
RR steel car axles	51.00 to 52.00
RR couplers and knuckles	42.00 to 43.00
No. 1 machinery cast.	53.00 to 54.00
Cupola cast.	45.00 to 46.00
Cast iron wheels	41.00 to 42.00
Malleable	55.00 to 56.00
Stove plate	42.00 to 43.00
Steel car wheels	42.00 to 43.00
Stainless	
18-8 bundles and solids	215.00 to 222.50
18-8 turnings	115.00 to 120.00
430 bundles and solids	115.00 to 120.00
430 turnings	55.00 to 60.00

Philadelphia Area

No. 1 hvy. melting	$35.00 to $36.00
No. 2 hvy. melting	31.00 to 32.00
No. 1 dealer bundles	39.00 to 40.00
No. 2 bundles	22.00 to 23.00
No. 1 busheling	39.00 to 40.00
Machine shop turn.	18.00 to 19.00
Mixed bor. short turn.	21.00 to 22.00
Cast iron borings	18.00 to 19.00
Shoveling turnings	22.00 to 23.00
Clean cast. chem. borings	24.00 to 25.00
Low phos. 5 ft and under	42.00 to 43.00
Low phos. 2 ft punch'gs	44.00 to 45.00
Elec. furnace bundles	41.00 to 42.00
Heavy turnings	30.00 to 31.00
RR specialties	47.00 to 48.00
Rails, 18 in. and under	66.00 to 67.00
Cupola cast.	41.00 to 42.00
Heavy breakable cast	43.00 to 44.00
Cast iron car wheels	47.00 to 48.00
Malleable	63.00 to 64.00
No. 1 machinery cast.	51.00 to 52.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$31.50 to $32.50
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	35.00 to 36.00
No. 2 bundles	21.50 to 22.50
Machine shop turn.	15.00 to 16.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	18.00 to 19.00
Low phos. 18 in. and under	45.00 to 46.00
Rails, random length	50.00 to 51.00
Rails, 18 in. and under	56.00 to 57.00
No. 1 cupola cast.	45.00 to 46.00
Hvy. breakable cast.	37.00 to 38.00
Drop broken cast.	54.00 to 55.00

Youngstown

No. 1 hvy. melting	$39.00 to 40.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	39.00 to 40.00
No. 2 bundles	24.00 to 25.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	20.00 to 21.00
Low phos. plate	40.00 to 41.00

Cleveland

No. 1 hvy. melting	$35.50 to $36.50
No. 2 hvy. melting	25.50 to 26.50
No. 1 dealer bundles	35.50 to 36.50
No. 1 factory bundles	41.00 to 42.00
No. 2 bundles	20.50 to 21.50
No. 1 busheling	35.50 to 36.50
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	17.00 to 18.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Cut structural & plates, 2 ft & under	44.00 to 45.00
Drop forge flashings	35.50 to 36.50
Low phos. punch'gs plate	36.50 to 37.50
Foundry steel, 2 ft & under	37.00 to 38.00
No. 1 RR hvy. melting	41.00 to 42.00
Rails 2 ft and under	57.00 to 58.00
Rails 18 in. and under	61.00 to 62.00
Steel axle turnings	24.00 to 25.00
Railroad cast.	55.00 to 56.00
No. 1 machinery cast.	55.00 to 56.00
Stove plate	48.00 to 49.00
Malleable	58.00 to 59.00
Stainless	
18-8 bundles	210.00 to 220.00
18-8 turnings	90.00 to 100.00
430 bundles	105 to 115.00

Buffalo

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 busheling	32.00 to 33.00
No. 1 dealer bundles	32.00 to 33.00
No. 2 bundles	22.00 to 23.00
Machine shop turn.	15.00 to 16.00
Mixed bor. and turn.	16.00 to 17.00
Shoveling turnings	19.00 to 20.00
Cast iron borings	16.00 to 17.00
Low phos. plate	40.00 to 41.00
Structurals and plate, 2 ft and under	40.00 to 41.00
Scrap rails, random lgth.	38.00 to 39.00
Rails 2 ft and under	48.00 to 49.00
No. 1 machinery cast.	48.00 to 49.00
No. 1 cupola cast.	44.00 to 45.00

St. Louis

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	31.00 to 32.00
No. 1 dealer bundles	35.00 to 36.00
No. 2 bundles	21.00 to 22.00
Machine shop turn.	15.00 to 16.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	23.00 to 24.00
No. 1 RR hvy. melting	38.00 to 39.00
Rails, random lengths	46.00 to 47.00
Rails, 18 in. and under	48.00 to 49.00
Angles and splice bars	42.00 to 43.00
RR specialties	42.00 to 43.00
Cupola cast.	49.00 to 50.00
Heavy breakable cast.	39.00 to 40.00
Stove plate	40.00 to 41.00
Cast iron car wheels	39.00 to 40.00
Rerolling rails	57.00 to 58.00
Unstripped motor blocks	39.00 to 40.00

Birmingham

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	28.00 to 29.00
No. 1 dealer bundles	32.00 to 33.00
No. 2 bundles	22.00 to 23.00
No. 1 busheling	38.00 to 39.00
Machine shop turn.	21.00 to 22.00
Shoveling turnings	22.00 to 23.00
Cast iron borings	12.00 to 13.00
Electric furnace bundles	38.00 to 39.00
Elec. furnace, 3 ft & under	36.00 to 37.00
Bar crops and plate	41.00 to 42.00
Structural and plate, 2 ft.	41.00 to 42.00
No. 1 RR hvy. melting	35.00 to 36.00
Scrap rails, random lgth.	47.00 to 48.00
Rails, 18 in. and under	53.00 to 54.00
Angles and splice bars	45.00 to 46.00
Rerolling rails	55.00 to 56.00
No. 1 cupola cast.	49.00 to 50.00
Stove plate	49.00 to 50.00
Cast iron car wheels	41.00 to 42.00
Unstripped motor blocks	38.00 to 39.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	22.00 to 23.00
No. 2 dealer bundles	16.00 to 17.00
Machine shop turnings	9.00 to 10.00
Mixed bor. and turn.	10.00 to 11.00
Shoveling turnings	11.00 to 12.00
Clean cast. chem. borings	21.00 to 22.00
No. 1 machinery cast.	39.00 to 40.00
Mixed yard cast.	36.00 to 37.00
Heavy breakable cast.	37.00 to 38.00
Stainless	
18-8 prepared solids	200.00 to 205.00
18-8 turnings	85.00 to 90.00
430 prepared solids	85.00 to 90.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	17.00 to 18.00
No. 1 dealer bundles	32.00 to 33.00
No. 2 bundles	15.00 to 16.00
No. 1 busheling	30.00 to 31.00
Drop forge flashings	30.00 to 31.00
Machine shop turn.	12.00 to 13.00
Mixed bor. and turn.	14.00 to 15.00
Shoveling turnings	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Heavy breakable cast.	37.00 to 38.00
Mixed cupola cast.	44.00 to 45.00
Automotive cast.	50.00 to 51.00
Stainless	
18-8 bundles and solids	205.00 to 210.00
18-8 turnings	75.00 to 80.00
430 bundles and solids	95.00 to 100.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	22.00 to 23.00
No. 1 dealer bundles	30.00 to 31.00
No. 2 bundles	15.00 to 16.00
No. 1 busheling	30.00 to 31.00
Machine shop turn.	8.00 to 9.00
Shoveling turnings	13.50 to 14.50
Clean cast. chem. borings	14.50 to 15.50
No. 1 machinery cast	40.00 to 41.00
Mixed cupola cast	34.00 to 35.00
Heavy breakable cast.	32.00 to 33.00

San Francisco

No. 1 hvy. melting	$38.00
No. 2 hvy. melting	34.00
No. 1 dealer bundles	34.00
No. 2 bundles	22.00
Machine shop turn.	17.00
Cast iron borings	$17.00 to 18.00
No. 1 cupola cast.	46.00

Los Angeles

No. 1 hvy. melting	$38.00
No. 2 hvy. melting	35.00
No. 1 dealer bundles	34.00
No. 2 bundles	20.00
Machine shop turn.	$17.00 to 18.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Elec. furn. 1 ft and under (foundry)	49.00
No. 1 cupola cast.	45.00

Seattle

No. 1 hvy. melting	$35.00
No. 2 hvy. melting	33.00
No. 2 bundles	22.00
No. 1 cupola cast.	36.00
Mixed yard cast.	36.00

Hamilton, Ont.

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.25
No. 2 hvy. melting	28.25
No. 1 dealer bundles	32.25
No. 2 bundles	24.00
Mixed steel scrap	24.25
Bush., new fact., prep'd	32.25
Bush., new fact., unprep'd	26.25
Machine shop turn.	14.00
Short steel turn.	17.00
Mixed bor. and turn.	13.00
Cast scrap	$46.50 to 48.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$37.00
No. 2 hvy. melting	34.00
No. 2 bundles	23.00
Machine shop turn.	16.00
Shoveling turnings	20.00
Cut structural plate 2 ft & under	$44.50 to 45.50
Unstripped motor blocks	32.00 to 33.00
Cupola cast.	39.00 to 40.00
Heavy breakable cast.	29.00 to 30.00

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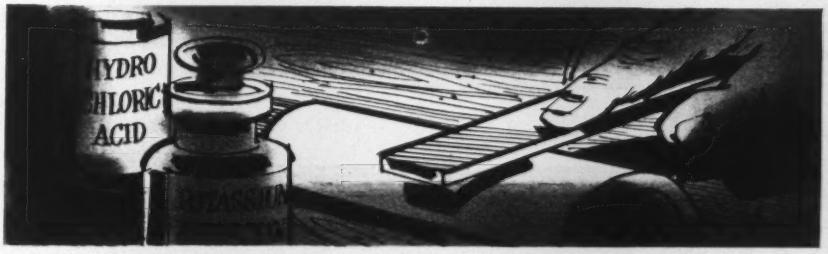
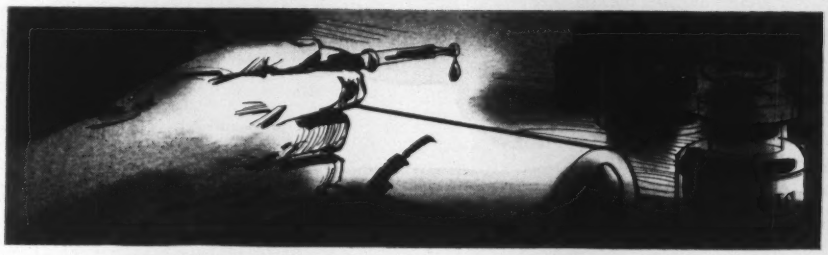


Rub specimen with file to obtain clean surface. Add 1 drop of 10% hydrochloric acid and let react for 1 minute. Add 1 drop of 10% potassium ferricyanide solution. After 30 seconds, if dark green or blue color appears, sample belongs to iron alloy group.

Add concentrated sulphuric acid; if there is no reaction in a minute's time, follow with a drop of 1:1 nitric acid. If there is still no reaction try 1 drop of hydrochloric acid followed by a solution of 6% sulphurous acid. In 30 seconds if no black smudge appears, test for magnetic properties. If not magnetic, add 1 drop of 1:1 hydrochloric acid and after reaction period, add 1 drop of 10% potassium ferricyanide. If a white drop with a black edge appears, the specimen may be a very high nickel-chromium alloy or 309 or 310.



Add 1 drop of concentrated hydrochloric acid and 1 drop of acidified cupric chloride to a fresh surface. At the end of 1 minute, if there is a copper flash, the specimens are probably either 309 or 310.

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Are Copper Prices Stabilizing?

Users are not rushing into the copper market in spite of low inventories.

Some see recent market restraint as an indication of more stable copper pricing.

▪ The copper market is settling rather than sagging. This is the opinion throughout the trade.

Most vulnerable to change right now are the premiums tacked on by custom smelters and brokers over the producers' price. These are dropping slowly, but surely, as consumers hang back, buying only for current consumption.

How Far? — One experienced copper man believes that within a short time the market will settle at around 33¢ per lb, the price the major producers are charging.

He says there is an excellent chance that producers will not move their prices through the entire first half.

Wait and See—It's the outlook ahead rather than current supply that is holding buyers back. There is no doubt but that by the start of the second quarter there will be plenty of copper to meet any demand.

It's apparent that buyers are placing their orders hand-to-mouth. Most sellers believe there is plenty of inventory rebuilding to be done, but that buyers won't do it until they are sure supply is strong enough to take the added demand without pushing prices up.

Using Restraint — One major buyer has been placing orders regularly for small amounts, for immediate use, throughout the entire series of copper strikes. Sometimes he has paid up to 40¢ per lb. His stocks are low, but he doesn't believe the time is ripe yet for rebuilding.

Perhaps of more significance, says another copper man, is the restraint with which both producers and buyers conducted themselves when strikes had closed up a large part of domestic capacity. He believes this means there may never again be a wild scramble for copper that would drive the price almost out of sight as happened during 1954-55.

Why? The tendency to stock up in advance when supply is threatened, and the apparent maturity to resist the impulse to overbuy during tight periods.

Aluminum

A new method of alloying in the aluminum pots, or in adjacent holding furnaces, prompted Aluminum Co. of America to post what amounts to a price cut for silicon grades of alloy pig.

The Alcoa move affected primarily foundries and diecasters, major users of silicon grades. They can now buy 50 lb pigs at about 1¢ per lb less than the price for ingot.

The Alcoa development, which the company hopes is only the first step in that direction, has shaved the price to where some grades of alloy pig are actually cheaper than commercially pure pig.

Examples of the new prices:

Grade	New Price	Old Price
Alloy 2312	25.7	26.5
Semi-Alloy 2314	25.9	26.5
Semi-Alloy 2370	25.8	26.5

Price of commerically pure pig is 26¢ per lb.

Kaiser Aluminum and Chemical Co. announced an improved grade of screw machine stock alloy. Called Mirco-chip, it's an improvement on alloy 2011-T3, the company says. A spokesman says field testing of the new stock shows improved machining characteristics.

Magnesium

The figures for 1959 are in. For shipments of wrought products and primary production, the year was better than 1958. Fourth quarter production of 9589 tons brought the total for the year to 31,033 tons, or three pct over 1958.

Shipments of wrought products dropped off in the fourth quarter to 2608 tons. But the total of 11,090 tons for the year was 18 pct ahead of 1958.

Tin prices for the week: Feb. 24 —101.25; Feb. 25—1001.00; Feb. 26 — 101.00; Feb. 29 — 100.00; March 1—100.00*.
* Estimate.

Primary Prices

(cents per lb)	current price	last price	date of change
Aluminum pig	26.00	24.70	12/17/59
Aluminum ingot	28.10	26.80	12/17/59
Copper (E)	33.00	30-33	11/12/59
Copper (CS)	35.00	33.00	12/23/59
Copper (L)	33.00	31.50	11/6/59
Lead, St. L.	11.80	12.30	12/21/59
Lead, N. Y.	12.00	12.50	12/21/59
Magnesium ingot	36.00	34.50	8/13/58
Magnesium pig	35.25	33.75	8/13/58
Nickel	74.00	64.50	12/8/58
Titanium sponge	150-160	162-182	8/1/59
Zinc, E. St. L.	13.00	12.50	1/8/60
Zinc, N. Y.	13.50	13.00	1/8/60

ALUMINUM: 99% Ingot COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. TIN: See above; Other primary prices, pg. 157.

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.038	.048-.061	.077-.096	.136-.250
1100, 3003	47.8	47.3	46.2	45.1
5052	54.2	53.0	50.8	49.2
6061-0	51.0	49.8	47.9	46.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	44.7-46.2	53.2-60.8
18-32	45.2-46.8	57.7-79.9
33-38	48.8-51.4	83.3-94.5
39-44	58.7-62.4	99.9-121.0

Screw Machine Stock—2011-T-3

Size"	¼	⅜-⅝	¾-1	1¼-1½
Price	62.0	61.2	59.7	57.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.411	$1.884	$2.353	$2.823
.024 gage	1.762	2.349	2.937	3.524

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	103.1
AZ31B Spec.	.....	93.3	96.9	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade... (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	57.13	.....	54.86	58.32
Brass, Yellow	50.57	50.86	50.26	54.23
Brass, Low	53.53	53.82	53.22	57.09
Brass, R L	54.58	54.87	54.27	58.14
Brass, Naval	55.12	.....	48.68	58.78
Munts Metal	53.20	.....	48.26	.....
Comm. Bs.	56.17	56.46	55.86	59.42
Mang. Bs.	58.86	.....	52.21	.....
Phos. Bs. 5%	77.44	.....	78.19	.....

Free Cutting Brass Rod 36.06

TITANIUM

(Base prices f.o.b. mill)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17.00. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; Bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. 29.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be $74.75
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $71.50
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.50
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic base ... $ 1.31
Cobalt, 97-99% (per lb) ... $1.75 to $1.82
Germanium, per gm, f.o.b. Miami, Okla., refined ..... 29.95 to 36.95
Gold, U. S. Treas., per troy oz..... $35.00
Indium, 99.9%, dollars per troy oz. $ 2.25
Iridium, dollars per troy oz.... $75 to $85
Lithium, 98% ..... $9.00 to $12.00
Magnesium sticks, 10,000 lb. 57.00
Mercury, dollars per 76-lb flask f.o.b. New York ..... $211 to $214
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel 69.60
Palladium, dollars per troy oz.. $24 to $26
Platinum, dollars per troy oz.. $82 to $85
Rhodium ..... $137 to $140
Silver ingots (¢ per troy oz.) 91.375
Thorium, per kg. $43.00
Vanadium ..... $ 3.65
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
No. 115 ..... 30.75
No. 120 ..... 29.75
No. 123 ..... 28.75
80-10-10 ingot
No. 305 ..... 35.25
No. 315 ..... 33.00
88-10-2 ingot
No. 210 ..... 44.00
No. 215 ..... 40.75
No. 245 ..... 36.00
Yellow ingot
No. 405 ..... 24.75
Manganese bronze
No. 421 ..... 29.25

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
0.30 copper max. 25.75-26.00
0.60 copper max. 25.50-25.75
Piston alloys (No. 132 type).. 28.00-29.00
No. 12 alum. (No. 2 grade)... 24.75-25.25
108 alloy 25.25-25.75
195 alloy 27.75-28.75
13 alloy (0.60 copper max.)... 25.75-26.00
AXS-679 (1 pct zinc) 25.00-26.00

(Effective Mar. 1, 1960)

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-97½% 25.25-26.25
Grade 2—92-95% 24.00-25.00
Grade 3—90-92% 23.00-24.00
Grade 4—85-90% 22.50-23.50

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	29	28¼
Yellow brass	22¼	20¼
Red brass	25¾	25
Comm. bronze	26½	26
Mang. bronze	20¾	20
Free cutting rod ends.	21¼	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 28¾
No. 2 copper wire 25½
Light copper 23¼
*Refinery brass 23¾
Copper bearing material 23½
*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 28
No. 2 copper wire 25
Light copper 22½
No. 1 composition 21
No. 1 comp. turnings 21
Hvy. yellow brass solids 16
Brass pipe 15½
Radiators 16½

Aluminum

Mixed old cast. ..... 14½—15½
Mixed new clips ..... 17 —17½
Mixed turnings, dry ..... 15 —16

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire ..... 25¼—25¾
No. 2 copper wire ..... 22¾—22¼
Light copper ..... 20¼—20¾
Auto radiators (unsweated) 14 —14½
No. 1 composition ..... 18 —18½
No. 1 composition turnings.. 16½—17
Cocks and faucets ..... 14¼—14½
Clean heavy yellow brass ... 12½—12¾
Brass pipe ..... 14¼—14½
New soft brass clippings .... 14½—14¾
No. 1 brass rod turnings .... 11¾—12

Aluminum

Alum. pistons and struts .... 7½— 8
Aluminum crankcase ..... 11¼—11¾
1100 (2s) aluminum clippings 15 —15½
Old sheet and utensils ..... 11¼—11¾
Borings and turnings ..... 7 — 7½
Industrial castings ..... 11¼—11¾
2020 (24S) clippings ..... 12½—13

Zinc

New zinc clippings ..... 7 — 7¼
Old zinc ..... 4½— 5
Zinc routings ..... 3¼— 3½
Old die cast scrap ..... 2¾— 3

Nickel and Monel

Pure nickel clippings 52-54
Clean nickel turnings 40
Nickel anodes 52-54
Nickel rod ends 52-54
New Monel clippings 28-29
Clean Monel turnings 20-23
Old sheet Monel 24-26
Nickel silver clippings, mixed 18
Nickel silver turnings, mixed 15

Lead

Soft scrap lead ..... 8 — 8¼
Battery plates (dry) ..... 3 — 3¼
Batteries, acid free ..... 2 — 2¼

Miscellaneous

Block tin ..... 75 —76
No. 1 pewter ..... 55 —56
Auto babbitt ..... 39 —40
Mixed common babbitt ..... 9¾—10¼
Solder joints ..... 13¼—13¾
Siphon tops 41
Small foundry type ..... 9¾—10¼
Monotype ..... 9¾—10¼
Lino. and stereotype ..... 8¾— 9
Electrotype ..... 7½— 7¾
Hand picked type shells .... 5¼— 5¾
Lino. and stereo. dross ..... 2¼— 2¾
Electro dross ..... 2¼— 2¾

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PIL-ING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3 B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$104.50 *A2*	$126.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*		5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Bridgeport, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3,* $114.00 *T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.525 *A1,T8, M8*	7.575 *W8*		8.40 *W8, S9,I3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5,J3*		10.75 *A5*	8.40 *J3*	
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1,P11*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Ohio Sharon, Pa.		$99.50 *S1;* *C10*	$119.00 *C10,S1*					5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport, Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *J3,B4* 7.525 *E3*			8.40 *S9*	15.55 *S9*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*			6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

(Effective Mar. 1, 1960)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* *1.25*-lb. base box	Electro** *0.25*-lb. base box	Hallowaré Enameling *29* ga.
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*	† Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price, 0.75 lb./0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. **ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*			$10.50 *U1*	$9.20 *U1*	
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*			7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	
	Worcester, Mass.									6.70 *A5*			
	Trenton, N. J.												
MIDDLE WEST	Alton, Ill.									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*						
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3,W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3,Y1*	6.275 *U1, I3,Y1*	6.875 *U1, I3*	6.775 *U1, I3,Y1*	7.225 *U1*	7.525 *U1, Y1,I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1,Y1*	7.85 *U1, Y1*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	7.95 *G2*
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *E2*							
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *S1*	7.225 *S1**, *R3*	7.525 *R3, S1*	9.275 *R3,*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Donora, Aliquippa, McKeesport, Pa.	5.10 *U1, J3,P6*	6.275 *U1, J3,P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3,P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	7.85 *U1, J3*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3,W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W3, W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	7.85 *W5*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*	7.50 *J3**	6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2,R3*	$10.50 *T2*	$9.20 *T2*	
	Houston, Texas									6.65 *S2*			

* Electrogalvanized sheets.

(Effective Mar. 1, 1960)

*7.425 at Sharon-Niles is 7.225

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. **Base prices**, f.o.b. mill, in cents per lb., unless otherwise noted. **Extras apply.**

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr'a. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *C4*		7.50 *C4*	7.95 *C4*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Harrisburg, Pa.							5.30 *P2*	6.375 *P2*			
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Fairless, Pa.	5.825 *U1*	5.825 *U1*		6.875 *U1*							
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.675 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7, A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3* 6.475 *T5*	9.025 *R3,R2* 8.775 *T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875 *L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8,B5* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5* 9.225 *B5,P3, P8*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, I1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*					5.30 *N4*				8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Weirton, Wheeling, Follansbee, W. Va.							5.30 *W5*				
	Youngstown, Ohio	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, S12*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*	6.425 *B2,A10*				9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga.	5.875 *A8*	5.675 *A8*									8.00 *A8*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective Mar. 1, 1960) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Steel Co., Pacific Coast Div.
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C4 Claymont Products Dept., Claymont, Del.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B., Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire-Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owenboro, Ky.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Chicago, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co., Carnegie, Pa.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Steel Corp., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.
S14 Screw and Bolt Corp. of America, Pittsburgh, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.
Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING — **Base discounts (net) f.o.b. mills. Base price about $200 per net ton.**

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½-3 In.		2 In.		2½ In.		3 In.		3½-4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50								
Youngstown *R3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50								
Fontana *K1*	+10.75	+26.00	+7.75	+22.00	+4.25	+17.50	+1.75	+16.75	+1.25	+15.75	+0.75	+15.25	0.75	+15.50								
Pittsburgh *J3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Alton, Ill. *L1*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50								
Sharon *M3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50								
Fairless *N2*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50								
Pittsburgh *N1*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Wheeling *W5*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50								
Wheatland *W4*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50								
Youngstown *Y1*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Indiana Harbor *Y1*	1.25	+14.0	4.25	+10.0	7.75	+5.50	10.25	+4.75	10.75	+3.75	11.25	+3.25	12.75	+3.50								
Lorain *N2*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50								
Youngstown *R3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Fairless *N2*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50								
Fontana *K1*	+6.25		+2.25		0.75		1.25		1.75		2.25		2.75									
Pittsburgh *J3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Alton, Ill. *L1*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50								
Sharon *M3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Pittsburgh *N1*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Wheeling *W5*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Wheatland *W4*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Youngstown *Y1*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Indiana Harbor *Y1*	5.75	+8.0	9.75	+4.0	12.75	0.50	13.25	+0.75	13.75	0.25	14.25	0.75	14.75	+0.50								
Lorain *N2*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.
Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.00¢ per lb.

(Effective Mar. 1, 1960)

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2

High-carbon chromium .. .955 D-3, D-5
Oil hardened manganese .505 O-2
Special carbon .38 W-1
Extra carbon .38 W-1
Regular carbon .325 W-1

Warehouse prices on and east of Mississippi are 1¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*L4, C4, A3, J2*) 10 pct	Plate (*L4, C4, A3, J2*) 15 pct	Plate (*L4, C4, A3, J2*) 20 pct	Sheet (*I2*) 20 pct
Stainless Type	302	.....	.....	.....	37.50
	304	28.80	31.55	34.30	40.00
	316	42.20	46.25	50.25	58.75
	321	34.50	37.75	41.05	47.25
	347	40.80	44.65	48.55	57.00
	405	24.60	26.90	29.25	.....
	410	22.70	24.85	27.00	.....
	430	23.45	25.65	27.90	.....

CR Strip (S9) Copper, 10 pct, 2 sides, 44.20; 1 side, 36.80.

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.75	6.725	7.25	.....	.....	.....
Cleveland *R3*	.....	.....	.....	.....	.....	15.35
So. Chicago *R3*	.....	.....	.....	10.10	.....	.....
Ensley *T2*	5.75	6.725	.....	.....	.....	.....
Fairfield *T2*	.....	6.725	.....	10.10	6.875	.....
Gary *U1*	5.75	.....	.....	.....	6.875	.....
Huntington, *C16*	.....	6.725	.....	.....	.....	.....
Ind. Harbor *I3*	.....	.....	.....	10.10	.....	.....
Johnstown *B3*	.....	6.725	.....	.....	.....	.....
Joliet *U1*	.....	.....	7.25	.....	.....	.....
Kansas City *S2*	.....	.....	.....	10.10	.....	15.35
Lackawanna *B3*	5.75	6.725	7.25	.....	6.875	.....
Lebanon *B3*	.....	.....	7.25	.....	.....	15.35
Minnequa *C6*	5.75	7.225	7.25	10.10	6.875	15.35
Pittsburgh *S14*	.....	.....	.....	.....	.....	15.35
Pittsburgh *J3*	.....	.....	.....	10.10	.....	.....
Seattle *B2*	.....	.....	.....	.....	6.75	15.85
Steelton *B3*	5.75	.....	7.25	.....	6.875	.....
Struthers *Y1*	.....	.....	.....	10.10	.....	.....
Torrance *C7*	.....	.....	.....	.....	6.75	.....
Williamsport *S5*	.....	6.725	.....	.....	.....	.....
Youngstown *R3*	.....	.....	.....	10.10	.....	.....

COKE

	Net-Ton
Furnace, beehive (f.o.b.) Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Ironton, O., f.o.b.	30.50
Detroit f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearney, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St. Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1959 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Cold-Reduced (Coiled or Cut Length) Fully Processed
Field	.....	9.875	.....
Armature	11.70	11.20	11.70
Elect.	12.40	11.90	12.40
Special Motor	.....	12.475	.....
Motor	13.55	13.05	13.55
Dynamo	14.65	14.15	14.65
Trans. 72	15.70	15.20	15.70
Trans. 65	16.30	Grain Oriented	
Trans. 58	16.80	Trans. 80	19.70
Trans. 52	17.85	Trans. 73	20.20
		Trans. 66	20.70

Producing points: Aliquippa (*J3*); Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*A9*); Niles, O. (*S1*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville, Butler (*A7*).

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE Diam. (In.)	Length (In.)	Price	CARBON* Diam. (In.)	Length (In.)	Price
24	84	27.25	40	100,110	12.50
20	72	26.50	35	110	11.20
18	72	27.50	30	110	11.70
14	72	27.25	24	72	11.95
12	72	28.25	20	90	11.55
10	60	29.50	17	72	12.10
10	48	30.00	14	72	12.55
7	60	29.75	10	60	13.80
6	60	33.25	8	60	14.25
4	40	37.00			
3	40	39.25			
2½	30	41.50			
2	24	64.00			

* Prices shown cover carbon nipples.

REFRACTORIES

Fire Clay Brick

Carloads per 1000

Super duty, Mo., Pa., Md., Ky.	$185.00
High duty (except Salina, Pa., add $5.00)	140.00
Medium duty	125.00
Low duty (except Salina, Pa., add $2.00)	103.00
Ground fire clay, net ton, bulk	22.50

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$158.00
Childs, Hays, Latrobe, Pa.	163.00
Chicago District	168.00
Western Utah	183.00
California	165.00
Super Duty Hays, Pa., Athens, Tex., Windham, Warren, O., Morrisville	163.00-168.00
Silica cement, net ton, bulk, Latrobe	29.75
Silica cement, net ton, bulk, Chicago	26.75
Silica cement, net ton, bulk, Ensley, Ala.	27.75
Silica cement, net ton, bulk, Mt. Union	25.75
Silica cement, net ton, bulk, Utah and Calif.	39.00

Chrome Brick

Per net ton

Standard chemically bonded, Balt.	$109.00
Standard chemically bonded, Curtiner, Calif.	119.00
Burned, Balt.	103.00

Magnesite Brick

Standard, Baltimore	$140.00
Chemically bonded, Baltimore	119.00

Grain Magnesite

St. ⅜ to ½-in. grains

Domestic, f.o.b. Baltimore in bulk.	$73.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev. in bulk	46.00
in sacks	52.00-54.00

Dead Burned Dolomite

Per net ton

F.o.b. bulk, producing points in: Pa., W. Va., Ohio	$16.75
Missouri Valley	15.60
Midwest	17.00

(Effective Mar. 1, 1960)

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard Q Coated Nails Col	Woven Wire Fence Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Annld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	173	187	....	212	193	9.00	9.55
Aliquippa *J3***	173	190	....	....	190	9.00	9.675
Atlanta *A8***	175	192	....	214	198	8.75	9.425
Bartonville *K2***	175	192	178	214	198	9.10	9.775
Buffalo *W6*	.....	.....	.....	.....	.....	9.00	9.55*
Chicago *N4***	173	190	177	212	196	9.00	9.70
Chicago *R3*	.....	.....	.....	.....	.....	9.00	9.55
Cleveland *A6*	.....	.....	.....	.....	.....	.....	.....
Cleveland *A5*	.....	.....	.....	.....	.....	9.00	.....
Crawf'dav. *M4***	175	192	....	214	198	9.10	9.775
Donora, Pa. *A5*	173	187	....	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	....	212	193	9.00	9.55
Galveston *D4*	9.10‡	.....	.....	.....	.....	.....	.....
Houston *S2*	178	192	....	217	198	9.25	9.80†
Jacksonville *M4*	184-1	197	....	219	203	9.10	9.775
Johnstown *B3***	173	190	17.	....	196	9.00	9.675
Joliet, Ill. *A5*	173	187	....	212	193	9.00	9.55
Kokomo *C9*	175	189	....	214	195*	9.10	9.65*
L. Angeles *B2****	.....	.....	.....	.....	.....	9.95	10.625
Kansas City *S2**	178	192	....	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass. *W6*	.....	.....	.....	.....	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	....	....	213	9.95	10.50
Rankin, Pa. *A5*	173	187	....	....	193	9.00	9.55
So. Chicago *R3*	173	187	....	....	193	8.65	9.20
S. San Fran. *C6*	.....	.....	.....	236	.....	9.95	10.50†
Sparrows Pt. *B3***	175	.....	....	214	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	.....	.....	.....	8.65	9.20
Worcester *A5*	179	.....	.....	.....	.....	9.30	9.85
Williamsport *S5*	.....	.....	.....	.....	.....	.....	.....

* Zinc less than .10¢. *** .10¢ zinc.
** 11-12¢ zinc. † Plus zinc extras.
‡ Wholesalers only.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26-0.40	0.41-0.60	0.61-0.80	0.81-1.05	1.06-1.35
Anderson, Ind. *G4*	8.95	10.40	12.60	15.60	18.55
Baltimore, Md. *T8*	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. *W12*	.....	10.70	12.90	16.10	19.30
Boston *T8*	9.50	10.70	12.90	15.90	18.85
Buffalo, N. Y. *R7*	8.95	10.40	12.60	15.60	18.55
Carnegie, Pa. *S9*	8.95	10.40	12.60	15.60	18.55
Chicago	.....	.....	.....	15.60	.....
Cleveland *A5*	8.95	10.40	12.60	15.60	18.55
Dearborn *S1*	9.05	10.50	12.70	.....	.....
Detroit *D1*	9.05	10.50	12.70	15.70	.....
Detroit *D2*	9.05	10.50	12.70	.....	.....
Dover, O. *G4*	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. *M8*	9.05	10.40	12.60	.....	.....
Franklin Park, Ill. *T8*	9.05	10.40	12.60	15.60	18.55
Harrison, N. J. *C11*	.....	.....	12.90	16.10	19.30
Indianapolis *R5*	9.10	10.55	12.60	15.60	18.55
Los Angeles *C1*	11.15	12.60	14.80	17.80	.....
New Britain, Conn. *S7*	9.40	10.70	12.90	15.90	18.85
New Castle, Pa. *B4*	8.95	10.40	12.60	15.60	.....
New Haven, Conn. *D1*	9.40	10.70	12.90	15.90	.....
Pawtucket, R. I. *N7*	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. *A1*	9.05	10.40	12.60	15.60	18.55
Sharon, Pa. *S1*	8.95	10.40	12.60	15.60	18.55
Trenton, *R4*	.....	10.70	12.90	16.10	19.30
Wallingford *W1*	9.40	10.70	12.90	15.90	18.55
Warren, Ohio *T4*	8.95	10.40	12.60	15.60	18.75
Worcester, Mass. *A5*	9.50	10.70	12.90	15.90	18.85
Youngstown *R5*	9.10	10.55	12.60	15.60	18.55

BOILER TUBES

$ per 100 ft. carload lots cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	Size B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
Babcock & Wilcox	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
National Tube	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
Pittsburgh Steel	2	13	40.28	47.21	.....
	2½	12	54.23	63.57	.....
	3	12	62.62	73.40	.....
	3½	11	73.11	85.70	.....
	4	10	97.08	113.80	.....

METAL POWDERS

Cents per lb, minimum truckload, delivered E. of Miss. River, unless otherwise noted.

Iron Powders

Compacting Powders

Electrolytic, imported, f.o.b.	29.50 to 33.00
Electrolytic, domestic	34.50
Sponge	11.50
Atomized	11.25
Hydrogen Reduced	11.25 to 12.00
Carbonyl	88.00
Welding Powders*	8.10
Cutting and Scarfing Powders*	9.10

Copper Powders

Molding Grades	
Electrolytic, domestic f.o.b. shipping point	49.25
Precipitated	49.50
Atomized	39.80 to 48.30
Hydrogen reduced, f.o.b.	49.25
Bronze	47.20 to 51.50
Chromium, electrolytic	$5.00
Lead	19.00
Manganese, f.o.b.	42.00
Molybdenum	$3.60 to $3.95
Nickel	$1.05 to $1.03
Nickel Silver	53.50
Nickel Steel	13.00
Solder	13¢ plus metal value
Stainless Steel, 302	$1.07
Stainless Steel, 316	$1.26
Steel, atomized, prealloyed, 4600 series	14.00 plus metal value
Tin	14¢ plus metal value
Titanium, 99.25+%, per lb., f.o.b.	$11.25
Tungsten	$3.15 (nominal)

* F.O.B., shipping point.

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)

Pct. Discounts

Bolts	1-4 Containers	5 Containers	20,000 Lb.	40,000 Lb.
Machine ½" and smaller x 3" and shorter	55	57	61	62
⅝" diam. x 3" and shorter	47	49½	54	55
¾" thru 1" diam x 6" and shorter	37	39½	45	46
¾" thru 1" diam. longer than 6" and 1½" and larger x all lengths	31	34	40	41
Rolled thread, ¼" and smaller x 3" and shorter	55	57	61	62
Carriage, lag, plow, tap, blank, step, elevator and fitting up bolts ½" and smaller x 6" and shorter	48	50½	55	56

Note: Add 25 pct for less than container quantity. Distributor prices are 5 pct less on bolts and square nuts.

Nuts, Hex, HP reg. & hvy.	Full case or Keg price
¾ in. or smaller	62
⅞ in. to 1½ in. inclusive	56
1⅝ in. and larger	51½
C. P. Hex, reg. & hvy.	
¾ in. or smaller	62
⅞ in. to 1½ in. inclusive	56
1⅝ in. and larger	51½
Hot Galv. Hex Nuts (All Types)	
¾ in. and smaller	41
Semi-finished Hex Nuts	
¾ in. or smaller	62
¾ in. to 1½ in. inclusive	56
1⅝ in. and larger	51½
(Add 25 pct for broken case or keg quantities)	
Finished	
⅞ in. and smaller	65

Rivets	*Base per 100 lb*
½ in. and larger	$12.85
	Pct. Off List
7/16 in. and smaller	15

Cap Screws	*Discount (Packages)*
	Full Finished H. C. Heat Treat
New std. hex head, packaged	Full Case
⅝" diam. and smaller x 6" and shorter	54	42
¾", ⅞", and 1" diam. x 6" and shorter	38	23
⅝" diam. and smaller x longer than 6"	..	..
¾", ⅞", and 1" diam. x longer than 6"	..	..

	C-1018 Steel Full-Finished Cartons	Bulk
¼" through ⅝" dia. x 6" and shorter	59	48
¾" through 1" dia. x 6" and shorter	45	32

Minimum quantity—¼" through ⅜" diam., 15,000 pieces; 7/16" through ⅝" diam., 5,000 pieces; ¾" through 1" diam., 2,000 pieces.

Machine Screws & Stove Bolts

	Discount Mach. Screws	Stove Bolts
Plain Finish Cartons	60	60
Bulk	*Quantity*	
To ¼" diam. incl.	25,000-and over	60	..
5/16 to ½" diam. incl.	15,000-200,000	60	..

Machine Screws & Stove Bolt Nuts

	Discount Hex	Square
In Cartons	16	19
In Bulk	*Quantity*	
⅜" diam. & smaller	25,000-and over	15	16

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper	
Rolled elliptical, 18 in. or longer, 5000 lb lots	48.00
Electrodeposited	40.00
Brass, 80-20, ball anodes, 2000 lb or more	53.00
Zinc, ball anodes, 2000 lb lots	19.75
(for elliptical add 1¢ per lb)	
Nickel, 99 pct plus, rolled carton, 5000 lb	1.0225
(Rolled depolarized add 3¢ per lb)	
Cadmium, 5000 lb	1.30

Tin, ball anodes $1.05 per lb (approx.).

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	65.90
Copper sulphate, 100 lb bags, per cwt.	27.75
Nickel salts, single, 100 lb bags	36.00
Nickel chloride, freight allowed, 100 lb	45.00
Sodium cyanide, domestic, f.o.b. N. Y., 200 lb drums	23.70
(Philadelphia price 25.00)	
Zinc cyanide, 100 lb	60.75
Potassium cyanide, 100 lb drum N. Y.	45.50
Chromic acid, flake type, 10,000 lb or more	30.44

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.5
Chicago	139.8
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

STEEL SERVICE CENTERS

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery† Charge	Sheets: Hot-Rolled (18 ga. & hvr.)	Sheets: Cold-Rolled (15 gage)	Sheets: Galvanized (10 gage)††	Strip: Hot-Rolled	Plates	Shapes: Standard Structural	Bars: Hot-Rolled (merchant)	Bars: Cold-Finished	Alloy Bars: Hot-Rolled 4615 As rolled	Alloy Bars: Hot-Rolled 4140 Annealed	Alloy Bars: Cold-Drawn 4615 As rolled	Alloy Bars: Cold-Drawn 4140 Annealed
Atlanta		8.59	9.87	10.13	8.91	9.29	9.40	9.39	13.24				
Baltimore**	$3.10	9.90	10.10	10.16	11.55	10.00	10.65	10.15	11.90	17.48	16.48	21.58	20.83
Birmingham**		9.43	10.20	10.46	10.91	9.79	10.00	9.59	13.14	16.76			
Boston**	.10	10.52	11.27	11.87	12.17	10.42	10.72	10.34	13.45	17.69	16.69	21.79	21.04
Buffalo**	.15	8.95	10.10	11.30	10.80	10.25	9.80	9.15	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	8.69	10.35	11.10	10.35	8.62	9.28	8.79	10.80	17.10	16.10	19.70	20.45
Cincinnati**	.15	8.86	10.41	11.10	10.67	9.00	9.84	9.11	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	8.88[1]	10.03	11.29	10.66	9.07	9.90	9.11	11.40	17.21	16.21	21.31	20.56
Denver	.20	9.60	11.84	12.94	9.63	9.96	10.04	10.00	11.19				20.84
Detroit**	.15	8.95	10.61	11.40	10.72	8.99	9.84	9.10	11.16	17.38	16.38	21.48	21.03
Houston**		10.13	10.60	12.19	11.28	9.47	9.34	9.42	13.10	17.50	16.55	21.55	20.85
Kansas City**	.15	9.36	11.02	11.50	11.02	9.25	9.95	9.46	11.72	17.17	15.87	21.87	21.12
Los Angeles**		9.95[1]	11.55	12.20	11.55	10.00	10.00	9.75	14.20	18.30	17.35	22.90	22.20
Memphis	.15	8.55	9.80		8.60	8.93	9.01	8.97	12.11				
Milwaukee**	.15	8.83	10.49	11.24	10.49	8.76	9.50	8.93	11.04	17.24	15.34	21.24	19.09
New York	.10	9.27	10.59	11.45	9.74	9.87	9.84	10.09	13.35	16.16	15.60	20.10	19.35
Norfolk	.20	8.20			8.90	8.65	9.20	8.90	10.70				
Philadelphia	.10	9.25	9.35	10.99	11.20	9.65	9.95	9.60	12.05	16.58	15.58	20.08	19.33
Pittsburgh**	.15	8.88	10.03	11.18	10.64	8.83	9.51	9.00	11.40	17.10	16.10	19.70	20.45
Portland		10.00	11.75	13.30	11.95	11.50	11.10	9.85	15.30	18.50	17.45	20.75	20.25
San Francisco**	.10	11.00	11.95[2]	11.65	12.25	11.00	10.95	10.75	15.20	18.30	17.35	22.90	22.20
Seattle**		11.55	12.30	12.50	12.65	11.00	10.20	11.10	16.20	18.60	17.80	22.70	22.20
Spokane**	.15	11.70	12.45	12.65	13.30	11.15	11.35	11.75	16.35	17.75	17.95	21.58	22.35
St. Louis**	.15	8.79	10.73	11.48	10.45	8.73	9.40	8.90	11.43	17.48	16.48	21.58	19.33
St. Paul**	.15	9.19	9.74	10.89	10.81	9.10	9.78	9.27	11.64		16.69		21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. ** These cities are on net pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—⅛" x 1"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—¾-2 15/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅝" to 2⅞"; cold drawn—15/16" to 2⅜" round; Hot-rolled 4140—⅝" to 2⅞" round, cold drawn—15/16" to 2⅜" round.

†† 13¢ zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier; [2] 14 ga. & lighter.

(Effective Mar. 1, 1960)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	.....
Birmingham *R5*	62.00	62.50*	.....	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	.....
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	68.00	68.50	69.00	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Everett *M6*	67.50	68.00	68.50	.....	.....
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	73.00†
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Add $1.00 for 0.31-0.69 pct phos.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1, I4*, (Globe Div.), $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add $1.00 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 18 pct. Add $1.00 for each 0.50 pct manganese over 1.00 pct. Bessemer silvery pig iron (under .10 pct phos.); $64.00.

† Intermediate low phos.

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	28.00	31.50	29.00	32.75	33.25	34.50	51.25	41.50	48.25	—	22.25	—	22.50
Billets, forging	—	37.75	38.75	39.50	42.50	42.00	64.50	48.75	57.75	29.25	29.25	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	49.50	75.75	57.50	67.25	35.00	35.00	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25-31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	55.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	44.25	69.25	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	55.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	47.00	71.75	54.50	63.75	33.25	33.25	33.75	33.75

STAINLESS STEEL PRODUCING POINTS.

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown, *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7,* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13,* (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1,* (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R3;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Ambridge, Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

(Effective Mar. 1, 1960)

CO_2 cast part for the transmission of one of the big 3's new compact cars

MODERN
CO_2 MOLDING
CUTS REJECTS FROM 9% TO LESS THAN 0.1%
PLUS:
Better Weight Control
Closer Tolerances
Improved Finish
Uniform Quality
at the same cost as green sand castings.

to fill your IMMEDIATE NEEDS for QUALITY PRECISION CASTINGS at LOWER COST

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You can count on Mundt's guarantee that sheets are perfectly flat, straight, parallel on the sides, and free from buckle or camber.

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53 FAIRMOUNT AVENUE, JERSEY CITY 4, N. J.

PERFORATING SPECIALISTS FOR ALL TYPES OF MATERIALS

Ferrochrome

Cents per lb contained Cr, lump, bulk, carloads, del'd. 67-71% Cr, .30-1.00% max. Si.

0.02% C....	41.00	0.50% C....	38.00
0.05% C....	39.00	1.00% C....	37.75
0.10% C....	38.50	1.50% C....	37.50
0.20% C....	38.25	2.00% C....	37.25

4.00-4.50% C, 60-70% Cr, 1-2% Si.. 37.25
3.50-5.00% C, 57-64% Cr, 2.00-4.50% Si 28.25
0.025% C (Simplex) 36.75
5-7% C, 61-65% Cr, 5-8% Si 22.00
5% max C, 50-55% Cr, 2% max Si.. 25.00

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule.

Chromium Metal

Per lb chromium, contained, packed, delivered, ton lots, 97.25% min. Cr, 1% max. Fe.

0.10% max. C $1.29
9 to 11% C, 88-91% Cr, 0.75% Fe... 1.38

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.

Carloads $1.15
Ton lots 1.17
Less ton lots 1.19

Low Carbon Ferrochrome Silicon

(Cr 39-41%, Si 42-45%, C 0.05% max.) Carloads, delivered, lump, 3-in. x down, packed.

Price is sum of contained Cr and contained Si.

	Cr	Si
Carloads, bulk	28.25	14.60
Ton lots	33.50	16.05
Less ton lots	35.10	17.70

Calcium-Silicon

Per lb of alloy, lump, delivered, packed. 30-33% Cr, 60-65% Si, 3.00 max. Fe.

Carloads, bulk 24.00
Ton lots 27.95
Less ton lots 29.45

Calcium-Manganese—Silicon

Cents per lb of alloy, lump, delivered, packed.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads, bulk 23.00
Ton lots 26.15
Less ton lots 27.15

SMZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.

Ton lots 21.15
Less ton lots 22.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.

Carload lots 18.45
Ton lots 19.95
Less ton lots 21.20

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload bulk 19.20
Ton lots to carload packed 21.15
Less ton lots 22.40

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn. Carload lots, bulk.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	11.00
Johnstown, Pa.	11.00
Lynchburg, Va.	11.00
Neville Island, Pa.	11.00
Sheridan, Pa.	11.00
Philo, Ohio	11.00
S. Duquesne	11.00

Add or substract 0.1¢ for each 1 pct Mn above or below base content.

Briquets, delivered, 66 pct Mn:

Carloads, bulk 13.70
Ton lots packed in bags 16.10

Spiegeleisen

Per gross ton, lump, f.o.b., 3% Si max.

	Palmerton, Pa. 10 lb, 35 lb,		Neville Is., Pa.
Mn	pig	down	35 lb
16-19% ..	$98.00	$96.00	$100.50
19-21% ..	100.00	98.00	102.50
21-23% ..	102.50	100.50	105.50

Manganese Metal

2 in. x down, cents per pound of metal delivered.

95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed 45.75
Ton lots 47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.

Carloads, bulk 34.25
Ton lots, palletized 36.25
250 to 1999 lb 39.00
Premium for Hydrogen - removed metal 0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn 24.00

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, packed, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% (Bulk) P, 90% Mn	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C.	31.10	33.90	35.10
0.30% max. C	29.80	32.60	33.80
0.50% max. C	28.50	31.30	32.50
0.75% max. C, 80.85% Mn, 5.0-7.0% Si ...	27.00	29.80	31.00

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.3¢ f.o.b. shipping point.

Carloads bulk 11.60
Ton lots, packed 13.25
Carloads, bulk, delivered, per lb of briquet 14.00
Briquets, packed pallets, 2000 lb up to carloads 16.40

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct., f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots,	Carloads,
98.25% Si, 0.50% Fe..	22.95	21.65
98% Si, 1.0% Fe	21.95	20.65

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.

Carloads, bulk 8.00
Ton lots, packed 10.80

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si....	14.60	75% Si....	16.90
65% Si....	15.75	85% Si....	18.60
	90% Si....	20.00	

Ferrovanadium

50-55% V delivered, per pound, contained V, in any quantity.

Openhearth 3.20
Crucible 3.30
High speed steel 3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
100 to 1999 lb..	2.40	3.30	4.55

(Effective Mar. 1, 1960)

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y., per lb.

Carloads, bulk ..... 9.85¢
Ton lots ..... 11.20¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo $1.50

Ferrocolumbium, 58-62% Cb, 2 in. x D, delivered per pound

Ton lots $3.45
Less ton lots 3.50

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Cb plus Ta $3.40

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.. $1.76

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $5.00 unitage, per gross ton $120.00
10 tons to less carload $131.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti $1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti $1.50
Less ton lots $1.54

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton $255.00

Ferrotungsten, ¼ x down packed, per pounds contained W, ton lots delivered ..... $2.15 (nominal)

Molybdic oxide, briquets per lb contained Mo, f.o.b. Langeloth, Pa. $1.49
bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.38

Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb.

Carload, bulk lump ..... 18.50¢
Ton lots, packed lump ..... 20.50¢
Less ton lots ..... 21.00¢

Vanadium oxide, 86-89% V_2O_5 per pound contained V_2O_5 .... $1.38

Zirconium silicon, per lb of alloy 35-40% del'd, carloads, bulk.. 26.25¢
12-15%, del'd lump, bulk-carloads ..... 9.25¢

Boron Agents

Borosil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B
2000 lb carload $5.50

Ferro Zirconium Boron, Zr 50% to 60%, B 0.8% to 1.0%, Si 8% max., C 8% max., Fe balance, f.o.b. Niagara Falls, New York, freight allowed, in any quantity per pound ..... 30¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.
Ton lots per pound ..... 18.25¢

Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots.. $1.20
F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up
10 to 14% B ..... .85
14 to 19% 1.20
19% min. B 1.50

Grainal, f.o.b. Cambridge, O., freight, allowed, 100 lb and over
No. 1 ..... $1.05
No. 79 ..... 50¢

Manganese-Boron, 75.00% Mn, 17.50% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.
Ton lots (packed) $1.46
Less ton lots (packed) 1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots 2.15

REBUILT—GUARANTEED ELECTRICAL EQUIPMENT

MOTOR GENERATOR SETS

TYPICAL FOR MILL & REEL DRIVES

(2) 3500-K.W. Al. Chal. 5-unit Sets of (2) 1750-KW Gen., 350/700-VDC, (1) 5000-H.P. Syn. Motor, 13800/6900/4160-V., 3 ph., 60 cy. (1) 40-KW & (1) 10-KW Exciters.

(1) 600-K.W. Gen. Elec., 3-unit Set of (2) 300-KW, 250-VDC Gen. & (1) 750-HP Syn. Motor 4160/2300-V., 3 ph., 60 cy. & Magnetic F.V. Starting Cubicles.

(1) 200-K.W. Gen. Elec. 3-unit Set of (2) 100-KW Gen., 250-VDC, B.B. & 300-HP Syn. Motor 2300-V., 3 ph., 60 cy. Mag. F.V. Starting equipment.

STANDARD GENERAL PURPOSE SETS

QU.	KW	MAKE	D.C. VOLTS	A.C. VOLTS
1	2400	G.E.	250	4600/2300
1	1500	G.E.	250	4600/2300
1	1250	G.E.	132/265	4160
2	500	Whse.	280	4000/2300
1	400	G.E.	275	4000/2300
1	300	G.E.	250	4000/2300
4	250	Whse.	250	2300
2	200	G.E.	250/275	4000/2300
2	150	G.E.	250	440
1	125	G.E.	250	440
1	100	G.E.	250	440

(1)—1250-KVA Whse. Hi-Cycle Frequency Set, 800-V., 960 cycle with 1875-HP syn. motor, 2300-V., 3 ph., 60 cy. with all switchgear.

T. B. MAC CABE COMPANY

4302 Clarissa St., Philadelphia 40, Penna.

Cable Address "Macsteel" Philadelphia, Pa.

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FOR SALE

1—3" Rd. Cap. Open End Vertical Bar Shear

1—2¾" Cap. Buffalo Billet Shear

1—10" Dia. x 20" Face 3-Hi Experimental Mill with 35 H.P. Motor

1—2½" x 8" 4-Hi Experimental Mill with 20 H.P. Motor

CURRY & HUDSON ASSOCIATES, INC.

ONE GATEWAY CENTER, PITTSBURGH 22, PA.

RAILWAY EQUIPMENT

USED and RECONDITIONED

RAILWAY CARS and REPAIR PARTS

FLAT CARS

4—50-Ton Capacity, 43' long Steel Underframe

30—Used, All-Steel 30-Cubic Yard, 50-Ton Capacity MAGOR AIR DUMP CARS Excellent Condition—Immediate Delivery

DIESEL-ELECTRIC LOCOMOTIVES

3, G. E. 44-Ton, 400 H.P., Std. Ga.

1, G. E. 80-Ton, 500 H.P., Std. Ga.

1, 125-Ton RAILROAD TRACK SCALE

IRON & STEEL PRODUCTS, INC.

13496 S. Brainard Ave. Chicago 33, Ill. Ph: Mitchell 6-1212

51-B E. 42nd St. New York 17, N. Y. Ph: YUkon 6-4766

Pittsburgh Business Still Spotty

Used machine dealers in the Pittsburgh area report that business is still on an off-and-on basis.

Dealers were looking for a big rush following the steel settlement. But it didn't come.

▪ Pittsburgh dealers still report spotty conditions.

There have been spurts in all lines and in some specialized areas there has been a real surge. But as a general thing, orders are running below expectations.

Some Encouragement—Electrical equipment provides one of the few sources of encouragement. Until a few weeks ago, orders were lagging badly. Then at the start of February orders began to pour in from steel mills. A leading electrical supplier is now working overtime and expects February volume will double that of January.

Normally, electrical sales in this area follow steel operations closely. In the current steel boom, there had been a puzzling lag. The mills boosted operating rates rapidly after the startup in November. Electrical orders have only just begun to zoom.

No Thinking Time — Labor uncertainty in December may have accounted in part for the delay. Also the mills point out they have been too busy to think about replacements or repairs. Now, heavy shipments have taken some of the pressure off steel producers. And there is still enough uncertainly about the future to make producers cost conscious.

In the opinion of one dealer, this last point has worked in favor of rebuilt electrical equipment. Current mill operations are strong enough to call for a high rate of replacement. On the other hand, the pessimistic tone has made buyers shy away from new equipment prices.

Unsteady Demand—Other lines fail to show any clear trend. One supplier of general equipment reports a steady improvement. However, demand seems to be skipping around. Last month there was more interest in machine tools. This month saws, shears, punches and other fabricating items are getting the big play.

According to the same dealer, most inquiries right now are coming from the smaller plants. Machine shops seem to be expecting better business or have got it. Interest is local rather than national.

Money Problems — Tight money appears to be a major problem to this dealer. Customers are still reluctant to spend. Accounts are hard to collect.

Another general supplier calls business spotty. The order rate is not bad, says the dealer, but it is not as good as it should be. Straighteners, levelers, roll grinders and other mill auxiliaries are attracting the most interest. Demand is coming in short bursts.

Off and On — "Some days we're real busy. Then the next day the phone won't ring at all."

A similar condition is reported by a supplier of materials handling equipment. There have been flurries of orders for the lighter types of equipment but there is no sustained strength.

ROLLING MILLS—STEEL WORKS EQUIPMENT

1—32" & 20" x 110" PLATE MILL, 3-high.

1—28" x 40" HOT STRIP MILL, 2-high reversing, with 2500 HP D.C., motor generator, etc.

1—25" & 42" x 60" HOT STRIP MILL, 4-high.

1—24" x 38" 2-HIGH MILL driven by 400 HP motor, 4600/3/60.

1—22" x 36" 2-HIGH MILL driven by 600 HP motor, 4660/3/60.

1—2½" & 8" x 8" COLD STRIP MILL, 4-high.

1—8" x 10" COLD MILL including uncoiler.

2—28" 3-HIGH ROLL STANDS.

1—18" 3-HIGH BAR MILL, single stand.

1—New 16" BAR MILL, one 3-high roll stand, pinion stand.

1—10" BAR MILL with motor and gear drive.

1—9" BAR MILL, 3-high, five stands.

1—34" x 192" ROLL GRINDERS.

1—OPEN SIDE BAR SHEAR, Williams & White No. 14½, or 1¾" round.

1—ROLL LATHE, ENCLOSED HEADSTOCK, up to 36" dia. rolls.

1—OPEN HEARTH CHARGING MACHINE, 5 ton capacity 11' track gauge.

1—STRUCTURAL STEEL BUILDING 50' x 396', crane runway.

1—MAGNETIC SEPARATOR double pulley, Stearns.

1—SIDE TRIMMER. Streine, maximum width 48" makes 2 cuts 3/16" mild steel.

1—SCRAP BALLER, max. size scrap roll 24" O.D. x 24" long.

1—HALLDEN STRAIGHTENING and cutting-off machine, capacity .562" brass rod.

1—POINTER for tube 2" O.D. x ¼" wall maximum.

1—1200 HP GEAR DRIVE, 295 to 30 RPM

1—1200 HP GEAR DRIVE 353 to 94.5 RPM 3.73 to 1 ratio.

1—600 HP GEAR DRIVE, 1.698 to 1.

1—3500 HP MOTOR, 11000/6000 volts, 3 phase, 60 cycle, 514 RPM, synchronous, never used.

FRANK B. FOSTER, INC.

2220 Oliver Building, Pittsburgh 22, Pa.
Cable: "Foster, Pittsburgh" Telephone Atlantic 1-2780

VARIABLE VOLTAGE DRIVES

3 PHASE 60 CYCLE

Quan.	Size	Description
2	3000 HP	DC MOTORS—525 V. 600 RPM Whse. M.G. Sets—2500 K.W. Whse., 2300/4160 V.
1	2750 HP	DC MOTOR 450 V. 300 RPM Elliott 2200 K.W., Gen. Elec. 3 unit 450 V. DC Gen. with 3000 H.P. 720 RPM, 2300 V. AC Motor and Etc.
1	2250 HP	DC MOTOR 600 V. 400/500 RPM, G.E. M.G. Set—2000 K.W. G.E. AC Motor—2300 V.
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BOX H-33
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BOX H-34
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BOX H-37
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ADVERTISERS IN THIS ISSUE

An asterisk indicates that a booklet, or other information, is offered in the advertisement.

This index is published as a convenience. No liability is assumed for errors or omissions.

A

Aircraft Forged Tool Co., Inc..... 169
*Allegheny Ludlum Steel Corp... 113
Allen Mfg. Co. 111
*Allied Radio 132
*Allied Research Products, Inc.... 38
*American Shear Knife Co. 80
American Smelting & Refining Co. Continuous-Cast Department 128-129
American Society of Tool Engineers 141
American Steel & Wire Div., United States Steel Corp. 118
*American Welding & Mfg. Co... 106
*Armstrong-Blum Manufacturing Co. 76

B

Boden Steelbar & Bolt Co..... 169
Baldt Anchor, Chain & Forge Div. 170
Bay City Forge Co. 170
*Beatty Machine & Mfg. Co..... 105
Belyea Co., Inc. 167
Bethlehem Steel Co. 1
*Black & Decker Mfg. Co..... 39
Borg-Warner Industrial Cranes... 140
*Buffalo Forge Co. 47
*Bullard Co. 115
Bunker Hill Co. 18

C

Cadillac Machinery Co., Inc..... 167
Calumet Iron & Supply Co..... 169
Carco Industries, Inc. 170
Carlstrom Pressed Metal Co..... 170
Cattie, Joseph P. & Bros., Inc.... 116
Cincinnati Milling Machine Co. Cincinnati Milling Products Div. 46
*Clements Mfg. Co. 153
*Cleveland Worm & Gear Div., Eaton Mfg. Co. 52
Consumers Steel & Supply Co..... 169
Continental-Diamond Fibre Subsidiary of Budd Co. 49
Continuous-Cast Dept. American Smelting & Refining Co.....128-129
Copperweld Steel Co., Ohio Seamless Tube Div. 79
Cox & Sons Co. 167
*Cromwell Paper Co. 62
Crucible Steel Casting Co..... 153
*Crucible Steel Co. of America..44-45
Curry & Hudson Assoc., Inc..... 166

D

Davidson Pipe Co., Inc. 167
Deltronic Corp. 145
Denison Engineering Div. American Brake Shoe Co. 60
Detroit Steel Corp. 10
Diamond Manufacturing Co. 104
*Dykem Co. 172

E

Eastern Machinery Co. 167
*Eimco Corp. 117
Electric Furnace Co. 14
*Elwell-Parker Electric Co. 121

F

Fairfield Manufacturing Co. 130
Falk Machinery Co. 168
Fargo Foundry Co. 171
Fellows Gear Shaper Co. 24
Finkl, A. & Sons Co. 144
*Fischer Special Mfg. Co. 136
Foster, Frank B., Inc. 167

G

*Gardner Machine Co. 135
*Gates Rubber Co. 74
*German American Chamber of Commerce 145
*Gisholt Machine Co. 43
Glader Corp. 171
Glaubinger Machinery Co. 168
Gleason Works 125
Globe Trading Co. 167, 169
Goss & DeLeeuw Machine Co.... 116
*Grafo Colloids Corp. 153
Great Lakes Founders & Machine Corp. 164
Greist Manufacturing Co. 170

H

Haynes Stellite Co., Div. Union Carbide Corp. 35
*Homestead Valve Manufacturing Co. 123
Houghton, E. F. & Co. 36-37
Hughes, Arnold, Co. 168-169
Hyde Park Foundry & Machine Co. 114
Hyman, Joseph & Sons 168

I

*Industrial Brownhoist Corp. 5
Inland Steel Co. 126-127
International Nickel Co., Inc. ... 42
Ipsen Industries, Inc. 33
Iron & Steel Products, Inc. 166

K

Kaplan, M. S. Company 168
Kemp Mfg. Co., C. M. 143
*Kennametal Inc. 142
Keystone Forging Co. 170
King Foundries, Inc. 170

L

L-W Chuck Co. 153
Lang Machinery Co., Inc. 168
Lassman, Benjamin & Son 134
*Lewellen Mfg. Co. 15
*Lodge & Shipley Co. 48
Lukens Steel Co. 146
Luria Bros. & Co., Inc. 155

M

MacCabe, T. B., Co. 166
Malleable Castings Council 84-85
Matthews & Co., Jas. H. 82
Mesta Machine Co..Inside Front Cover
Midwest Steel Corp. 168
Miles Machinery Co. 168
Milton Equipment Co. 167
*Mundt, Chas. & Sons 164

N

National Acme Co. 26-27
National Business Bourse, Inc.... 171
*National Forge Co. 139
National Machinery Exchange ... 168
New Departure Div., General Motors Corp. 8
New England Pressed Steel Co... 170
*Niagara Machine & Tool Works 83
Northern Engineering Works 149

O

*Ohio Crankshaft Co. 86
*Ohio Seamless Tube Div. of Copperweld Steel Co. 79
Orange County Machinery, Inc... 168
Ottemiller, Wm. H. Co. 116
Owen Bucket Co. 145

P

*Pacific Industrial Manufacturing Co. 30-31
*Pannier Corp. 119
Pennsalt Chemicals Corp. 50
Performance Measurements Co. .. 13
Peterson Steels, Inc. 16
Philadelphia Gear Corp. 4
*Porter, H. K., Inc. 116
Porter, H. K., Co., Inc..... 171
Purdy Company 168

R

*Republic Steel Corp. 22-23
Roberts Co., C. A. 145
Roebling's, John A. Sons Corp..67, 171
Rosedale Foundry & Machine Co. 170

S

Saint Joseph Lead Co. 18
Salem-Brosius, Inc. 137
Saling Manufacturing Co. 170
*Sandvik Steel, Inc. 29, 122
Seaboard Steel Co., Inc. 169
Sharon Steel Corp. 6
Shepard Niles Crane & Hoist Corp. 124
Sherwin-Williams Co. 71
Signode Steel Strapping Co. ... 72
Simonds Saw & Steel Co. 138
Smith, Thomas Co. 169
Southern Screw Co. 11
Stanhope, R. C., Inc. 168
Steel Warehouse Co., Inc. 169
Sun Oil Co. 109
Surface Combustion Div. Midland-Ross Corp. 40-41
Swartz Pipe Co., Ltd..... 169

T

*Texaco Inc. 17
*Textile Machine Works 25
Timken Roller Bearing Co. 19
Tinnerman Products, Inc. 12
Tippins Machinery Co. 169
*Torrington Co. 103
Tractor & Equipment Co. 168
Tubular Rivet & Stud Co. 68

U

Ulbrich Stainless Steels 151
Union Carbide Corp. Haynes Stellite Div. 35
*U. S. Hoffman Machinery Corp..20-21

V

Valley Mould & Iron Corp. 131
Valley Steel Products Co. 170
Verson Allsteel Press Co...Back Cover
Virginia Gear & Machine Corp... 4

W

Wagner Electric Corp. 28
Wallack Bros. 168
Wapakoneta Machine Co. 172
Ward Steel Co. 132
Weatherly Foundry & Mfg. Co.... 170
Weiss, B. M., Co. 169
Weiss Steel Co., Inc..... 169
*Weston Instruments Div. of Daystrom, Inc. 34
Wilcox Forging Corp. 170
Wilson, Lee, Engineering Co., Inc. .....Inside Back Cover
Wood, R. D., Co. 133

Y

*Yoder Co. 32

CLASSIFIED SECTION

Clearing House 166-169
Contract Manufacturing 169-170
Employment Exchange 171
Equipment & Materials Wanted.. 169

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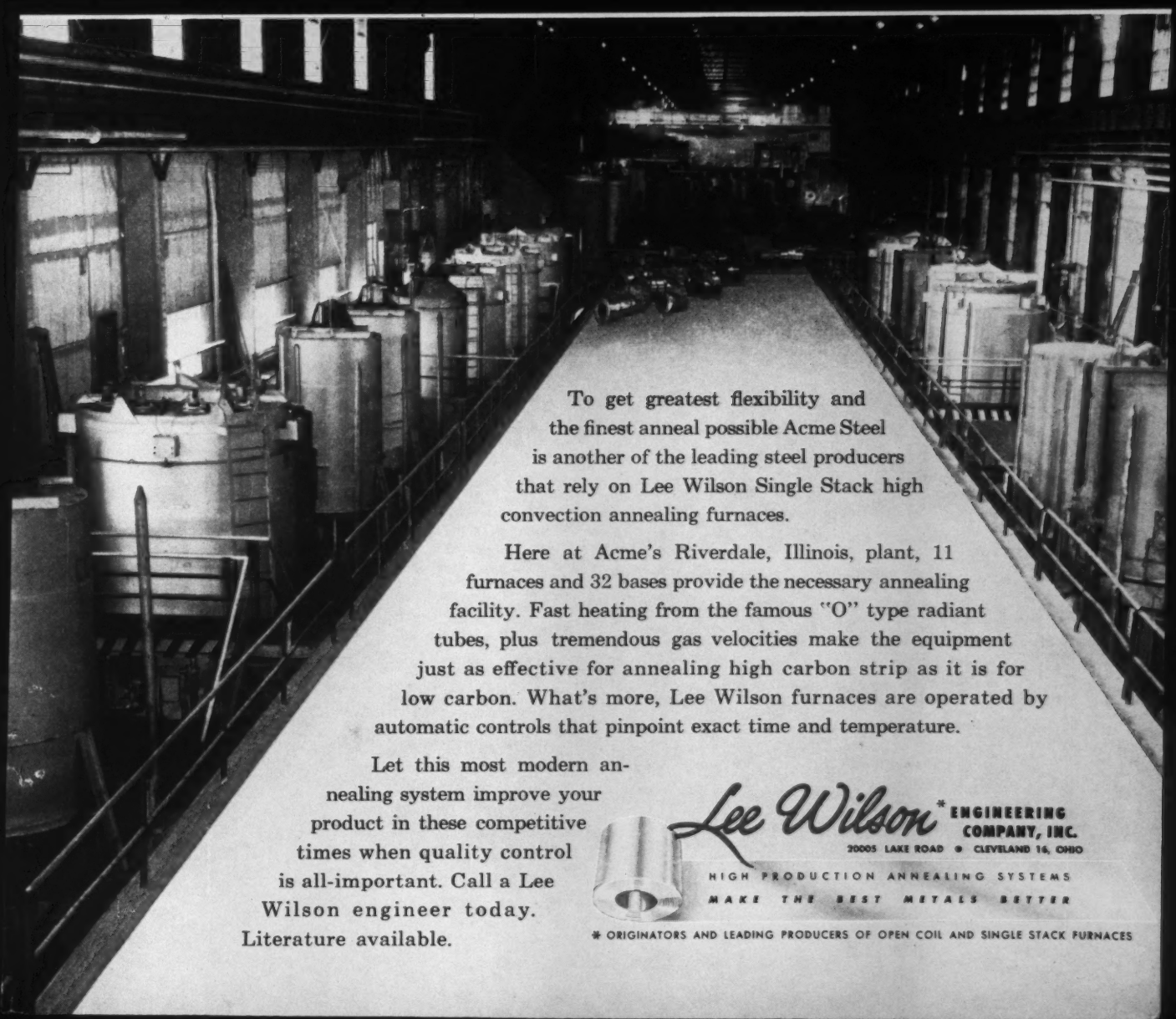

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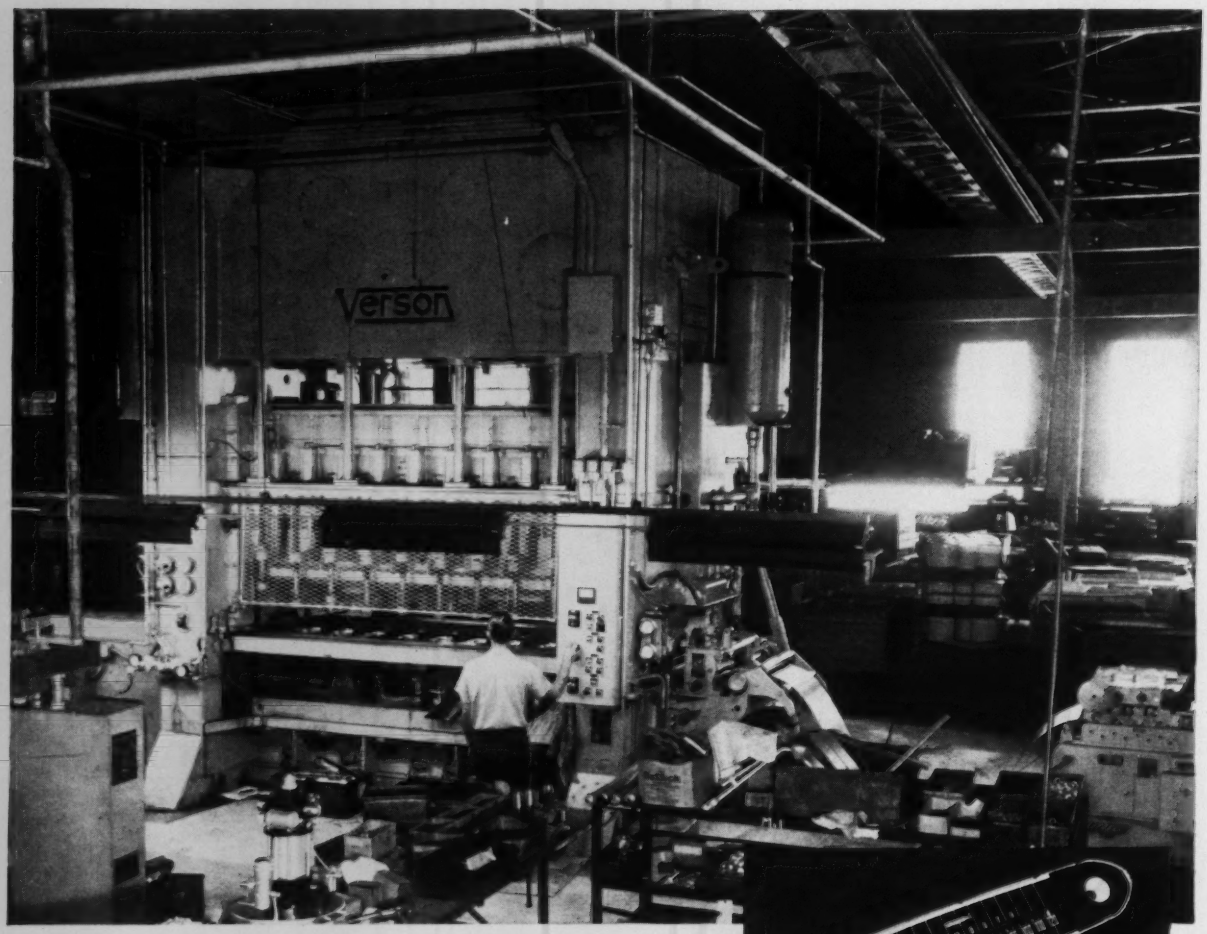

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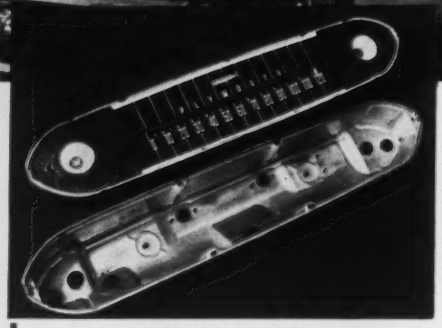

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